

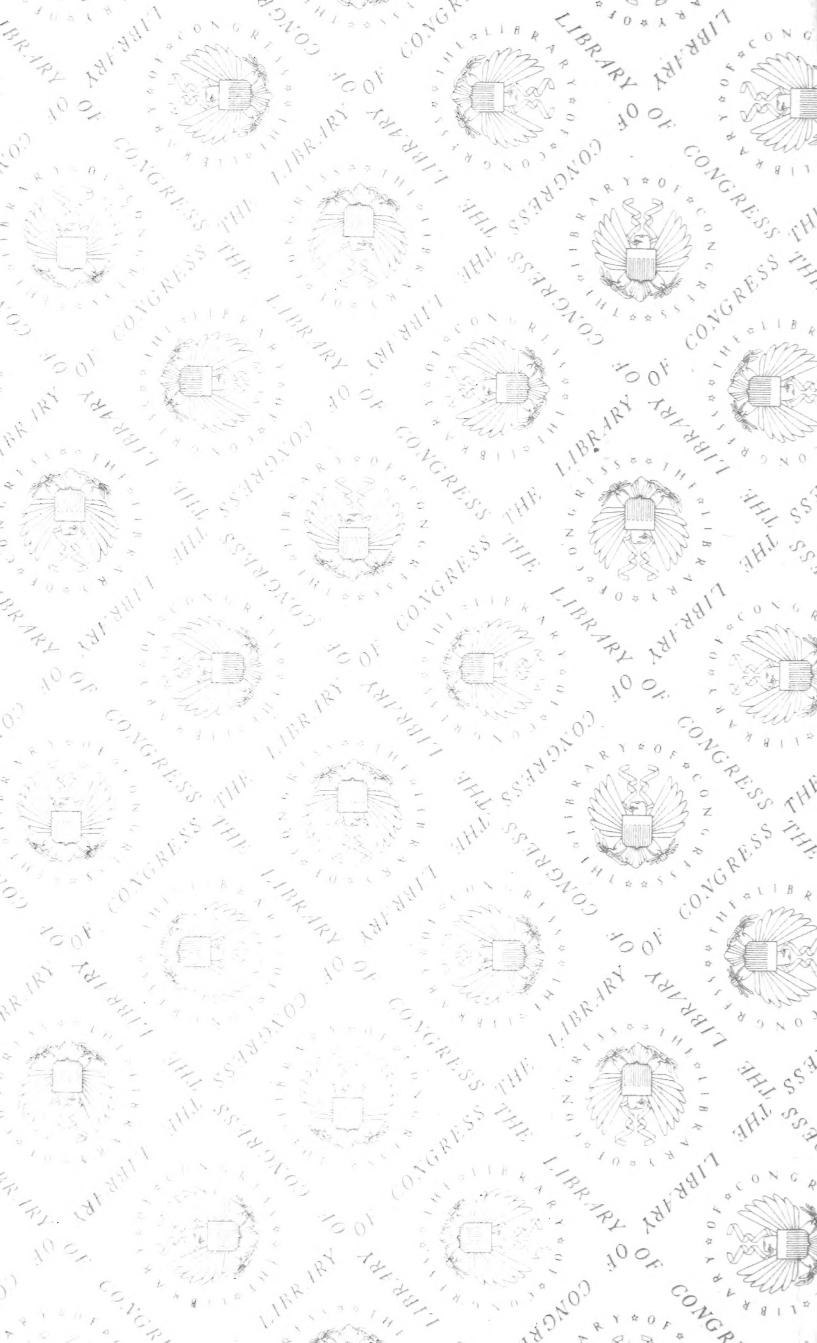
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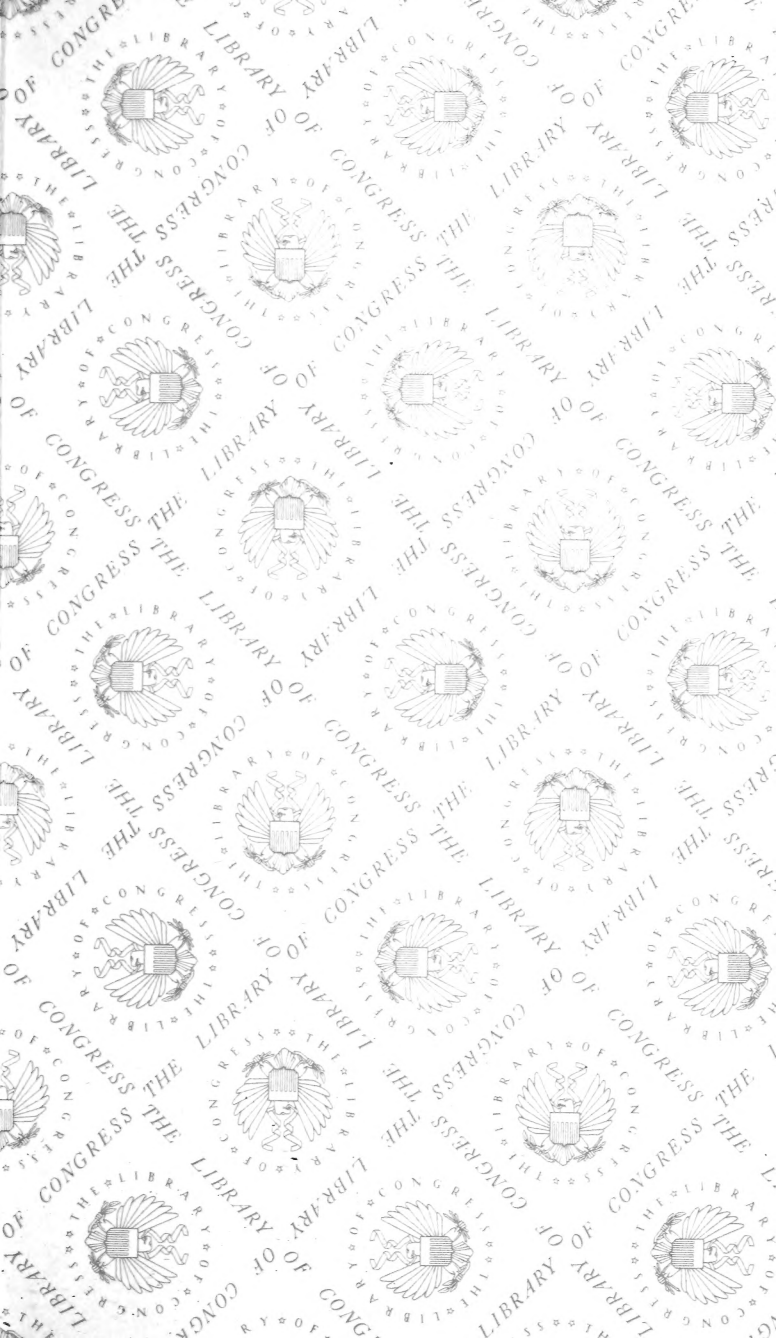
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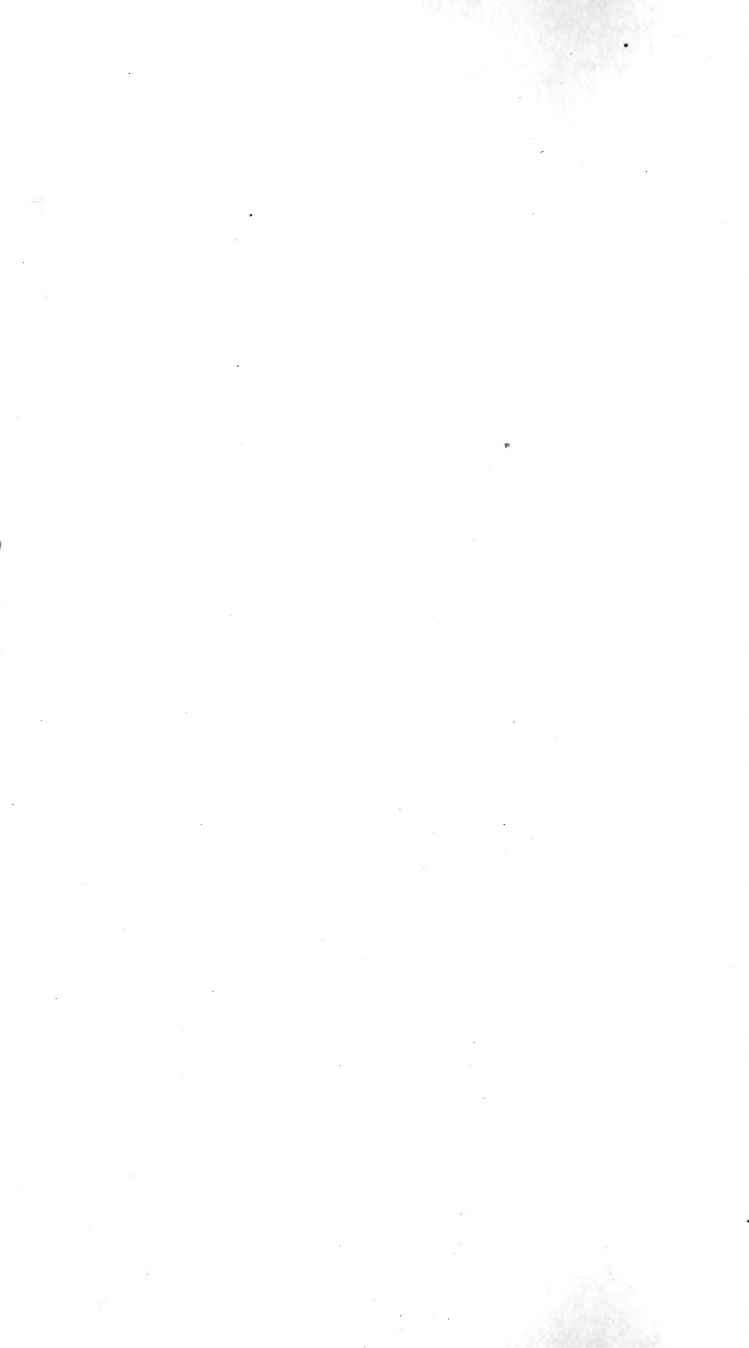
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THE
GARDENER'S
MONTHLY VOLUME.

V. 12

THE APPLE;
ITS CULTURE, USES, AND HISTORY.

BY GEORGE W. JOHNSON,

Author of "The Dictionary of Modern Gardening," "Gardener's
Almanack," &c.; and

R. ERRINGTON,

Gardener to Sir Philip Egerton, Bart.

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GARDENER'S ALMANAC.

BY GEORGE W. JOHNSON,
Editor of the Gardener's Almanac, Gardener's Dictionary, &c.

This very richly illustrated work ought to be in the possession not only of every reader of the **GARDENER'S ALMANAC**, but of every horticulturist. The woodcuts are numerous, and the information relative to Gardening new, abundant and important.

London: R. BALDWIN, 47, Paternoster Row.

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THE APPLE.

WALL CULTURE.

THE apple tree is rather impatient of restraint either on the espalier rail or wall, but its disposition to a growth too vigorous may be kept within fruitful bounds by a due attention to the border and training, though the tree, even in proportion to its size, can rarely be brought to be so productive as when grown as a standard.

Border.—We have already considered this subject fully in the section on "SOIL," but as we purpose giving an extended detail of Mr. C. Harrison's mode of wall-training, we will also strengthen what we have already said upon the subject of border-making by stating his relative practice.

Make, he says, *the border* three feet deep at the wall, and two feet six inches at the front, also twelve or fourteen broad. The surface of the under stratum to have an inclination from the wall to the front of the border of twelve inches. After this is done, a drain made to run close to the wall, and in a direction

with it; also another to run parallel with it, at the front of the border, and so made that all superabundant water can be carried entirely away from the border. The drains are so constructed that the tops of them are about three inches higher than the surface of the following composed substratum. After the drains are made, place all over the surface of the under stratum, three inches thick of moderate-sized gravel, stones, or brick-bats, broken to a small size; upon this spread about one inch thick of fine gravel (or, instead of it, strong road drift); the whole is then well rolled or beaten firmly together; after this is done, about three inches more gravel or small stones is laid, which is also beaten or rolled to an even surface, but not so as to bind them very close together. (*Gard. Mag.* iii. 1.)

First Year.—Winter Pruning.—The tree is headed down just before it begins to push; in doing which, the foot is placed upon the soil, and close to the bole, in order to prevent it from being drawn up by the force which is used in the operation. The cut is made in a sloping direction towards the wall, and about half an inch above the bud which is selected for the leading shoot. The tree is cut down so that seven buds remain.

Summer Pruning.—If all the buds push (which will generally be the case), they are all permitted to grow until they have attained three inches length,

when two of them are rubbed off; those rubbed off are the third and fourth buds, counting upwards from the origin of the tree. The uppermost shoot is trained straight up the wall for a leading stem, and the remaining four horizontally along the wall, two on each side the stem of the tree. These shoots are trained nine inches apart, for when they are much nearer than this they exclude the sun and air from operating upon the buds and wood in such a manner as is required to keep the tree productive. When the leading upright shoot has attained about fifteen inches in length, the end is pinched off so as to leave it about eleven inches long. This causes shoots to be produced from the upper part of the leader thus stopped, three of which are trained in, the uppermost straight up the wall, and the others one on each side the stem of the leader. This stopping of the leading shoot is not performed later than the end of June or early in July, for, when it is done much later, those shoots which push afterwards in that season do not arrive at a sufficient degree of maturity to withstand the winter, and are frequently destroyed by frost. When it happens that a tree has not done well in the early part of the season, and the upright shoot is not of a suitable length or vigour at the proper period for stopping it, it is not to be meddled with afterwards until the winter pruning of the tree.

Second Year.—Winter Pruning.—At the middle or

end of November the tree is pruned. The upright leading shoot is now shortened down to ten inches from the place where it was last stopped. The tree will now be represented by the accompanying sketch (fig. 1). The side shoots (but termed branches) are

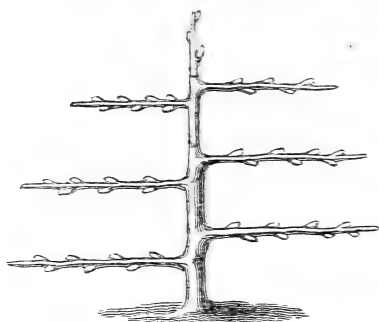


Fig. 1.

not shortened, but left their full length. If, during summer, the end of a branch should have been accidentally broken or damaged, the general consequence resulting from it is the production of several shoots or fruit buds. If shoots (which is generally the case) were produced, and were shortened during summer, agreeably to directions for similar shoots in the treatment of the tree for the second year, (see *Summer Pruning*), they are now cut down to about half an inch in length (fig. 2). If, instead of shoots, natural fruit buds should have been produced, (these are short and stiff, from half an inch to an inch in length,

and red at the ends), such are allowed to remain untouched, as it is on those that fruit are produced. The advantage of shortening back the upright shoot as much as is directed to be done is, that by it branches are certain to be produced at those places desired, so that no vacancy occurs. The leading upright shoot thus attended to will reach the top of a wall twelve feet high in seven years, which is as soon as the tree will be able to do, so as to support every part sufficiently. The tree is always loosened from the wall every winter pruning; the wall is swept and washed, also recoloured with paint or coal tar if required; the tree is also anointed with composition. Always lay some fresh mulch to the roots of the trees at this time.

Summer Pruning.—When the buds upon that part of the leading stem which was produced last have pushed, they are all rubbed off to the three uppermost. The topmost is trained straight up the wall, as a leader to the main stem; and the two others, one on each side. The instructions given for stopping the leading shoot in summer, also shortening it back in winter pruning, &c., are attended to until the tree arrives at a few inches from the top of the wall. The side branches are allowed to grow without being shortened back at any time, until they have extended as far as can be permitted, when they are pruned in every winter, by cutting back each leading shoot to

two buds from where it pushed the previous spring. Any shoots arising from the fore part of the main stem are taken clean away. The buds upon the wood made last year will this summer generally make fruitful ones. If, on the contrary (as is sometimes the case), shoots are produced instead of fruitful buds, they are allowed to grow ten or twelve inches long, until the wood attains a little hardness towards the bottom of it, when they are cut down to about two inches in length, and at the bottom part of what remains, one or two fruit buds are formed, so as to be productive in most cases the next year, but in others not until the second year. Although such a shoot was shortened as directed, yet it will generally push a shoot or more the same season from the top part of it. After such have grown a suitable length (as before described), they are cut back to about two inches from where they pushed. If more than one shoot were produced after the first shortening, and a bud or two is well swelled at the origin of the shoot (as before described), all the shoots are left, and shortened as directed; but, if no such bud is produced, all the shoots are cut clean away excepting one, which is treated in shortening as before directed. The latter practice will generally be found necessary, and also be more advantageous, as a greater portion of sun and air is admitted to the buds, which will be considerably strengthened and forwarded to a mature state.

If after such treatment fruit buds are not produced from the origin of the shoot, nail the shoot to the wall parallel with the branch, which is uniformly successful in producing them.

Third Year.—Winter Pruning.—Such of the buds as produced wood shoots the last year, and were shortened during summer as described, are now shortened more. It frequently happens that a fruitful bud, or in some instances two, will have been formed at the lower part of the shoot (fig. 2, *a a*) ; such shoots are now cut off about a quarter of an inch above the uppermost of the fruitful buds (*b*) ; but (as is sometimes the case) if there have not been fruitful buds produced, there will be growing buds, and then the shoots are cut down so as to leave one bud (fig. 2, *c*). On some occasions the growing buds and fruit-

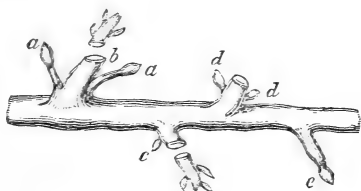


Fig. 2.

ful buds will appear but very indistinctly, and in an embryo state ; when this is the case the shoots are cut down so as to leave two of those embryo buds (*d d*). There are generally some natural fruit buds which

did not push to shoots; all such are left entire (*e*). They are of a reddish colour, and are easily distinguished from growing buds, which are considerably less, and all of a dark colour.

Summer Pruning.—This summer the fruitful buds are productive. When the fruit has swelled a little, a shoot generally proceeds from the stem of the spur (which it may now be called), just underneath the fruit: such are allowed to grow eight or ten inches long, and are then shortened back to two inches, or so as to leave three eyes upon each (fig. 3, A *a*). By shortening the shoot strength is thrown into the fruit,

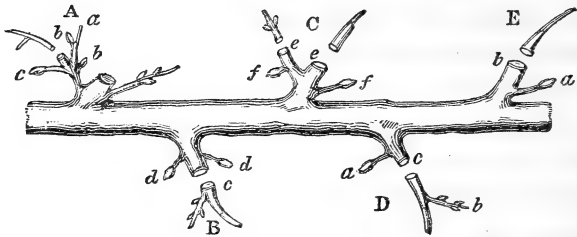


Fig. 3.

and, during the summer, two or more fruit buds are generally produced at the bottom of the shoot thus cut down (fig. 3, *b b*), or, otherwise, from the lower part of the spur (fig. 3, *c*). It sometimes occurs that, when the tree is very vigorous, some of the buds (fig. 3, *b b*) will push into shoots, or occasionally into bloom, during the latter end of summer. If shoots,

they are allowed to grow, and are then shortened, as described for similar shoots; but when bloom is produced, it is immediately cut off close under the blossom. The shoots (fig. 2, *c*) produced after the third year's winter pruning are allowed to grow, and are then shortened, as already directed for similar shoots. (See *Second Year's Summer Pruning*). The shoots which were pruned as directed last winter, and had embryo buds (fig. 2, *d d*) during this summer, generally have a fruit bud, and in some cases two, formed at their bases. The treatment of all shoots produced upon any of the spurs in future is agreeably to the previous instructions given. Always thin the fruit, and where two are situated together, take one away; this is to be done when you perceive them begin to flesh.

Fourth Year.—Winter Pruning.—The spurs (fig. 3, A B) which were productive last summer, and upon which a shoot was made and shortened (fig. 3, *a*, spur A), are now regulated in the following manner:—If there be two good fruit buds formed upon the stem of the spur (fig. 3, *d d*, spur B), all that part of it above such buds is cut away, about a quarter of an inch above the uppermost (as at *c*); but if there is only one good fruit bud upon the stem, and one upon the shoot which was cut in during the summer (as at *a*, spur A), then it is pruned off (as at spur C, *e e*), so that two buds only remain (as *f f*). When

there is only one fruit bud upon the stem of the spur (as spur D, *a*), and not fruitful buds at the shoot (*b*), then all the spur is pruned away (as at *c*). Sometimes those spurs that bear fruit will not have a shoot produced, but instead of it a fruitful bud (as spur E, *a*); it is then pruned off just above such bud.

Summer Pruning.—All shoots are pruned as already directed in the second and third years.

Fifth Year.—*Winter pruning.*—All the spurs are allowed to retain three fruitful buds each; but, as there are generally more than is required to keep, some of them are thinned away, retaining the best buds. The ripest buds are most plump and red at the ends. If such buds are situated near to the origin of the spur (as fig 4, spur A, *a a a*,) they are retained in preference to similar fruitful buds that are nigher

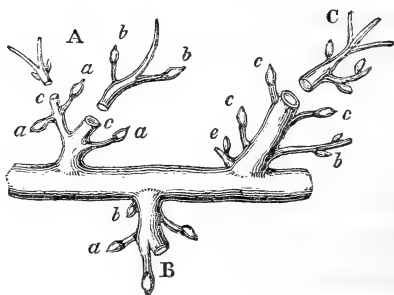


Fig. 4.

the end of the spur (as *b b*), the spur is then cut off

(as at *c c*). When there are no fruitful buds near to the origin of the spur, those are left that are farther off; but always take care to preserve the bud situated nearest to the branch which supports the spur, whether it be a growing or a fruitful one (as spur B, in which *a* is a fruitful bud, and *b* a growing one). If there be a suitable supply of buds upon the old part of the spur (as C, *c c c*), they are retained in preference to those buds formed at the bases of shoots which have been pruned during summer (*a e b*) for, when there is a proper supply on the old spur, all such shoots are cut clean away, with the exception of one that is situated near to the origin of the spur (as *e*), when that bud and the two next are only left.

Summer Pruning is performed as before directed.

Sixth Year.—Winter Pruning.—In order to convey a correct idea of the treatment of the spurs in future, it will be necessary to point them out by numbers, as 1, 2, and 3. The enumeration will proceed

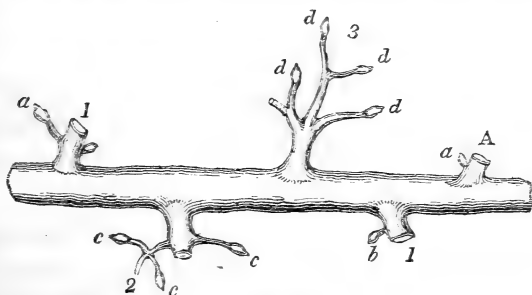


Fig. 5.

from the bole of the tree, along the branch. After three spurs are thus numbered, begin again, and proceed with No. 1, &c. (agreeably to fig 5). Every spur No. 1 is now cut down to the lowest bud there is upon it, whether it be a fruitful bud (as *a*), or a growing bud (as *b*). Every spur No. 2 to have three fruit buds (as *c c c*), and every spur No. 3 to have four fruit buds (as *d d d d*). When a spur No. 1 is destitute of either a fruitful or a growing bud towards the lower part of it, such a spur is cut down so low as only to leave about half an inch remaining (as fig. 5, A). There is generally an eye or embryo of a bud situated near to the origin of the spur (as *a*, spur A); from this a shoot or a fruitful bud is produced the ensuing summer, and thus a supply is obtained for that cut away.

Summer Pruning.—All shoots are shortened during summer, as before directed. Particular care is paid to the spurs No. 1, as a shoot or a fruitful bud is generally produced nearer to the base of the spur that was left at winter pruning, and most commonly at the opposite side of the spur to it. Either a shoot or a fruitful bud generally pushes from those spurs that were cut entirely down (as spur A, fig. 5); the shoots are cut down, as directed for others.

Seventh Year.—*Winter Pruning.*—The spurs No. 1 now generally have two fruit buds each; they are allowed to retain them (as fig. 6, *a a*). If, instead of

a fruitful bud, a shoot pushed (as *b*), and a fruitful bud was formed at the lower part of it, the shoot is

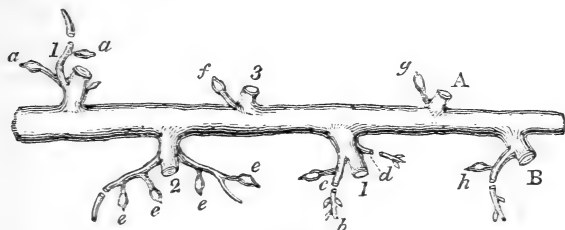


Fig. 6.

then cut off just above it (as at *c*) ; but, if there is not a fruitful bud formed, it is cut down so as to leave it an inch long (as at *d*). The spurs No. 2 have four fruit buds left upon each (as *e e e e*) ; the spurs No. 3 are now cut down, so that only one fruitful bud remains (as *f*). If a fruit bud has been produced from the spur (as spur A fig. 5), it is left entire (as fig. 6, *g*) ; but, if a shoot instead of a fruitful bud, it is cut off just above the lowest bud, whether a fruitful or a growing bud (as at *h*, spur B). This treatment to such spurs cut entirely down, is always pursued to similar ones in future.

Summer Pruning.—This is attended to agreeably to the foregoing directions.

Eighth Year.—Winter Pruning.—The spurs No. 1 are allowed to retain three buds each (as fig. 7, *a a a*), and the spurs No. 2 are now cut down (as *b*) ; the spurs No. 3 are regulated as was done to spurs

Nos. 1 and 2. (See *Sixth and Seventh Year's Summer Pruning.*)

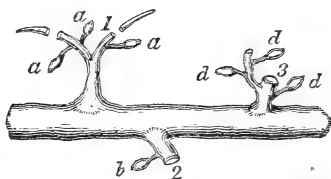


Fig. 7.

Ninth Year.—Winter Pruning.—The spurs No. 1 are allowed to have four fruit buds each (as fig. 8, *a a a a*); the spurs No. 1 to have two fruitful buds (as *b b*), and the spurs No. 3 to have three (as *c c c*).

Summer Pruning.—Performed as before.

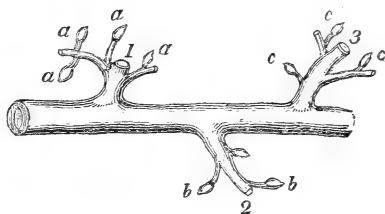


Fig. 8.

Tenth Year.—Winter Pruning.—The spurs No. 1 are now cut down again (as fig. 9, *a*, a fruitful bud, and *b*, a growing bud). The spurs No. 2 are pruned to three fruit buds (as *c c c*), and the spurs No. 3 to four fruit buds (as *d d d d*).

It will be observed that the spurs No. 1 have now

been cut down twice ; the first time in the sixth year, and the second in the tenth. Thus, those spurs cut

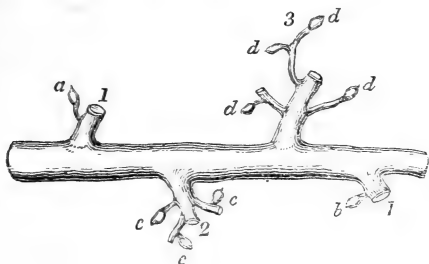


Fig. 9.

down to a fruitful bud (as fig. 5, *a*) have borne fruit four years ; and those spurs cut entirely down, or to a growing bud (as A, *b*, fig. 5), would have only borne fruit three years. In these two cases, always leave the spurs with three fruit buds each this winter, and cut them down the following winter, unless they have grown very vigorously and straggling.

The system already detailed of cutting down and renewing the spurs, is practised with all others as here directed. Thus, the next year, the spurs No. 3 are cut down (as in fig. 6, *f*) ; and the second year from this time, the spurs No. 2 (as fig. 7, *b*) ; and in the fourth year from the present time, the spurs No. 1 (as fig. 5, *a*, and fig. 9, *a*) require to be cut down again.

Conclusion.—To some the above directions may appear tedious and intricate ; but it became necessary

to enter into minute details, in order to illustrate the principle of this system of pruning, which is to obtain spurs always at a proper distance from each other, so that a suitable portion of sun and air may be admitted to them, and so that the spurs may always be kept supplied with young healthy wood and fruitful buds. (*Gard. Mag* iii. 2.)

To those who desire to make the apple a pet, and have plenty of spare time to attend to the minutiae as here detailed, the foregoing will be of immense assistance. Such a long detail, however, is rather too complicated for the many ; and we will shortly add a few plain words of advice as to the fundamental principles of wall-training ; principles which, however the thing may be carried out, must be steadily kept in view. In the first place, then, we would direct attention to the construction of the border, on which so much depends. When the expense of building walls is considered, we think that it is a mistaken economy not to take proper means to ensure success to the trees planted against them. A good sound and slightly adhesive soil must be obtained, but of this we spoke fully under the section Orchard Culture. In the next place, the border must be thoroughly drained. Mr. Harrison's directions on these heads are very complete indeed ; the only points in which we differ are in the depth of the border, and the introduction of a drain parallel with, and close to, the

wall. We think there is little occasion for the latter, more especially if a much shallower border is made. Mr. H. advises three feet deep at back ; we say two. There is no real necessity for all this expensive body of soil. It is well known that the solar rays are great ameliorators of the soil, and that, somehow or other, they conduce to the fructifying principle in fruits. Upon what grounds, then, can three feet of soil be advocated ? Deep roots have frequently been found to induce disease, more especially canker. Besides, if the tree be furnished with so much good soil, it must, if healthy, rapidly penetrate to the bottom ; and one sure consequence will be the production of much useless summer spray, and the entailment of much extra labour and attention. As to the pruning course suggested by Mr. Harrison, it appears very good ; indeed, scarcely any other course can be followed. We feel much gratified with his remarks on summer pruning ; too little attention is given to this point, and this is the besetting sin of modern training. Expensive walls are built, costly borders prepared, good trees sought out, and a most scientific mode of winter pruning carried out ; and yet the trees are barren—and why ? The reasons are obvious. It requires much light, as well as a free circulation of air, to elaborate perfect blossom buds ; and at the very period, the middle of summer, when this process is in full course, one-half the light, and much

of the free circulation of air, is arrested by a profusion of laterals, which are to be reserved for the same round of scientific winter pruning. Mr. Harrison has very properly recommended the pinching back superfluous summer laterals to about three leaves ; these will assist in the elaborative process, without shading the leaves of the blossom buds. We would merely advert to another point, and that is the distance at which the leaders should be trained. Mr. H. recommends, we find, nine inches ; we think this little enough ; if ten or eleven, so much the better. It is not the gardener who can cram the most wood within a given space who obtains the most fruit ; we think generally the reverse. However, we say, let no person think of placing them less than nine inches apart.

All the rest of Mr. Harrison's remarks are so good, and so evidently the results of an observant mind of great experience, that we need say no more on this head.

Ripeness of Fruit.—Having now passed through the various modes of cultivating the apple, we may offer a few remarks upon the modes of ascertaining the fitness of the fruit for gathering, reserving the consideration of storing to a future section. Note when the fruit *begins* to drop naturally from the tree, or, which is a better criterion to avoid loss by wind-falling, to part freely from the stem on being moved.

Failing in these outward indications of ripeness, the gardener has only to cut open a single fruit, and if the seeds appear of a black or brownish colour, it is fit to gather ; but if they are not coloured, then the fruit should be allowed to hang some time longer, because, if gathered prematurely, it will very soon afterwards shrivel, and never acquire that flavour, or keep so well under the most favourable circumstances, as when it is suffered to remain on the tree until it is thoroughly matured. In no case should fruit be shaken from the tree, as we too frequently see it done ; on the contrary, it ought to be all hand-picked when perfectly dry, and treated with the utmost care, to avoid bruising. When transferred from the basket in which it is gathered, to the place where it is finally to remain, the fruit should, if possible, be arranged side by side, with its eye downwards. (*Gard. Chron.* 1841, 644.)

Gathering is a point to which more than ordinary importance attaches, for the fruit should be plucked exactly at the time when it has arrived at a fit condition. This remark applies more particularly to those kinds which ripen in early autumn, and do not keep, perhaps, more than two or three months ; and this can only be determined by careful and frequent examinations. The too frequent practice of waiting until the fruit begins to drop is best avoided, and it is equally bad to gather before the fruit becomes properly matured ; in

the former case the fruit is apt to lose the finest part of its flavour, and never keeps in use so long as it otherwise would do ; and in the latter, owing to the imperfect elaboration of its juices, a due portion of saccharine matter is not secreted in the fruit, and consequently it never attains its proper flavour. In gathering the fruit, each should be taken by the hand, and gently lifted upwards ; the stalk will then readily separate from the branch, without breaking away the buds which are always situated near the fruit-stalk of each, and which are those that produce blossoms the next year. The circumstance that trees, after producing large crops, very frequently bear none, or but few, the following season, is occasioned as much by the careless manner of plucking—by which these buds are broken—as it is from exhaustion by reason of the excessive crop. (*Gard. Journ.* 1845, 603.)

The rules for gathering may be thus epitomized :—

1. Gather whilst the fruit requires a slight effort to separate them from the spurs. 2. Do not pull them off by main force, but bend them back until they separate from the branch. 3. Gather them in dry weather. 4. Let the gathering-baskets contain no more than a peck each, with two handles, a connecting rope, and an iron pothook.

Let each basket be lined throughout with sacking, and let the fruit of each basket be carried at once to the floor covered with sand, and taken out one by

one, not poured out, as is too usual, into a larger basket, and then again from this into a heap ; this systematic mode of inflicting small bruises is sure to usher in decay.

ESPALIER AND FANCY TRAINING.

WE consider no garden of any pretensions complete without the trained espalier, in some form or other. Independently of their use in producing fruit of a superior character, when rightly managed, they induce, perhaps, more towards the interest felt in the highly cultivated kitchen garden than any other feature. They serve to relieve the eye from the monotony produced, by gazing continually on the ordinary vegetables, which alone would give the idea of a mere commercial garden.

About drainage and soil, we need say nothing ; as far as the apple is concerned, precisely the same soil and the same precautions against excess of moisture are requisite here as in wall culture. We might indeed say almost the same in regard of pruning, whether summer or winter : we will, however, give that a special notice briefly, in order to draw attention to its principles.

Our first business will be with the various modes

of espalier training in practice. These may be comprised under the following designations.

- 1st. The ordinary wood espalier rail.
- 2nd. The strained wire espalier rail.
- 3rd. The cast-iron espalier rail.
- 4th. The horizontal or table trellis.
- 5th. The trellised arcade.
- 6th. The saddle espalier.
- 7th. Pryramidal or conical training.
- 8th. Pendulous or down training.

These, we believe, will comprise all the best modes in practice, to which the apple can be subjected.

The Ordinary Wood Espalier Rail.—This is best constructed of larch, or with oak uprights, and a larch rail at top. The uprights, whether of oak or larch, should be charred and tarred, previously, at the lower end. They are placed perpendicularly, at about nine or ten inches apart, and of about five feet in height. The trees, of course, are trained horizontally, and the main leaders should be established in parallel lines, at about nine inches apart. The main fabric of the tree must be progressively formed precisely in the way recommended by Mr. C. Harrison. The stakes will not last many years, neither is it particularly necessary, as the trees, under good management, will support themselves in as short a period.

The Strained Wire Espalier Rail.—This is one of the most economical, most durable, and handsomest rails at present in use in this country; not only for training fruit trees, but for a variety of other purposes, and is by no means sufficiently known. One of its greatest merits is its simplicity; as nothing is to be seen but a few plain uprights, and the horizontal wires. The uprights should be fixed on stones however, which should rise about six inches above the ground level: this will give the whole a more finished appearance. It is stated, on pretty good authority, that this fence may be erected for the very small sum of two shillings per yard lineal. The same height, viz. five feet, may be observed here as in the wooden rail, and the trees trained in the same way.

The Cast-Iron Espalier Rail.—We merely notice these rails in due course, to observe that they are much more expensive than the former. Where high architectural finish is required, they may however be employed, as they are capable of more expression and embellishment.

The Horizontal or Table Trellis.—This is a most desirable mode of training for the possessors of small gardens, where, from the severe limitation of space, it is by no means expedient to shut out even a small amount. They will, however, from being so very near

the soil, bring many of the tenderer kinds of fruit to a much greater degree of perfection than any other mode of espalier training. They are a very suitable accompaniment of the garden walk, but it is not expedient to have a border on the walk side: it is best to let them come to the edge of the walk. They should be about a foot from the ground, and should be formed of parallel bars, like the perpendicular trellises. They may, of course, be either metallic or of wood; and we see no reason why the strained wires before described should not be employed in this case.

The Trellised Arcade.—This mode of training is of more recent introduction, and it is very ornamental. It will form a very good connecting link, or mode of transition, from the kitchen to the flower-garden, or to anything of an episodal character. In all such cases they should be high enough for head room; seven feet would be required in the centre of the arch. They should, if possible, run nearly north and south, or at least not quite due east and west; as, in that event, there would be a northern aspect, which would certainly not suit the finer sorts of apples; although it might be made available for the Morello cherry, for currants, &c. &c. The principles of construction will be familiar to any ordinary workman: strong uprights to support the fabric, and bars to train are placed parallel at nine inches apart.

The Saddle Espalier.—Little need be said about this, for it is merely the trellised arcade, divested of the tall uprights. These are extensively employed in her Majesty's gardens at Frogmore, and tend to give the whole a geometric and highly-finished appearance. These would, perhaps, be more eligible for the owners of small gardens than any of the other modes; more especially if made in the manner of the strained wire rail before described. They may be from three to five feet high in the centre, and about five feet wide at the base; the bottom wires coming to within six inches of the ground.

We have now gone through the principal forms of espalier training, as applicable to the apple; and will now proceed to say a few words about fancy modes of training, without fencing or treillage of any kind.

Pyramidal or Conical Training.—We are not aware that this mode has been applied to the apple to any extent, but we can see no reason why it should not, where space is very limited, or artistical forms are requisite, which is sometimes the case in the immediate vicinity of buildings. Fine young plants, with strong and straight shoots, must be selected for the purpose, and they must be headed back, when established, to about thirty inches, in order to cause them to develop abundance of side shoots. A leader must be selected, and trained upward to form the main stem, and this

must be successively headed back in like manner, in order to get the stem well clothed. The trees, when completed, must form a complete pyramid, the bottom side branches extending about two to three feet from the base of the trunk every way, and tapering progressively towards the summit, which may be from six to seven feet in height. The ordinary rules of thinning to admit light must be practised, together with a course of summer stopping: by the latter means alone, the strength of the tree may at all times be equalised in all its parts. Trees to be thus closely pruned, which must of necessity be the case, should be severely limited at the root. We are of opinion that, wherever such close limitation of the branches is enforced, a compost composed of one-half sound loam, and the other half broken stones, to intercept the too speedy action of the roots, would be very beneficial. This, however, we have not proved, and merely throw out the hint for those disposed to experiment in this way.

Pendulous or Down Training.—This has been practised with much success for the apple, at Croxteth Park, the seat of the Earl of Sefton, as also at some other places. We have been in the habit of looking over the Croxteth gardens for nineteen years, and can therefore speak as to the success of this mode. We have, indeed, practised it to a very great extent

with the New Flemish pears ourselves, for sixteen years ; and we must say that it is always attended with the best of success, providing due attention be given to those preparatory steps, as well as subsequent processes, which become essential.

In applying this mode to the apple, a strongstemmed and clean young tree, of about two or three years from the graft, should be selected. When established, it should be headed down to the height of four feet maximum ; this will cause it to develop four or five shoots of a long and straight character. These, then, will commence the formation of the future principal down branches of the tree. They must be bent down by some means before the month of April ; some load them with balls of clay ; some tie them down by driving a hooked stick in the ground, and attaching them by a string. In the course of the succeeding summer, the sap being partially intercepted from these pendulous shoots, more shoots will be produced from the crown ; what are wanted of these must be reserved to undergo down training in the next spring ; the rest, of course, must be stopped in due time. And thus the tree is completed, the downward shoots describing a circle at their extremities of some three to four feet from the main stem on all sides.

We have now discussed all the modes at present known, as applicable to the apple ; but it must be borne in mind, that no system of deepening soils, or

high manuring, is compatible with such highly artificial modes of culture.

FORCING.

ABOUT the forcing of the apple comparatively little is known of a systematic character ; and we are not aware that any structure has hitherto been built specially for this purpose. That they can be forced there is little doubt ; but we think that in the present improved character of the dessert, few persons would undergo the trouble and expense of appropriating a house to them. However, as some of our readers may desire to grow them early in pots or tubs, we will endeavour to offer a little advice as to the proper course to pursue. As to structure, we should say that a low span-roof house, running north and south, with a walk along the two sides, and the middle appropriated to the dwarf apple trees in tubs, would be the most eligible. Those who have not such a structure, might keep them in an ordinary pit, sinking for head room. There should be two sets of plants, in order that choice might freely be made when any became exhausted. The plants should be what are termed "clean maidens," and should be grown from pot to pot, and thence to the tub or box in which

they are finally to remain. The young plants might be placed in a twelve-inch pot first, and remain in it for a couple of years, and then receive a shift into one a little larger; and in a couple of years longer, they would require a roomy box or tub; after which it would be needless to shift them, as they might be sustained many years by the application of liquid manures, and by top-dressings. The young plant being potted, should be headed back to a few buds on each shoot, of which there should be at least three; if four, so much the better. A very rich and adhesive loam should be chosen, with a great thickness of old turfy sward: this should be chopped with a spade into small pieces, and what loose soil became disintegrated should be utterly rejected, using the lumpy turf alone. We do not think that it would be expedient to use any farther amount of vegetable matter, the turf being so very full; but we think that some new horse-droppings might be added; and, above all, a liberal sprinkling of bone manure of the size of radish seeds, and plenty of small charcoal.

The plants being thus established, taking care above all things that they are thoroughly drained, they should be plunged above the ground level in some light medium, such as half-decomposed leaves, or cinder ashes.

In each season, when the young shoots had grown a foot in length, we would stop them by pinching:

this will have a tendency to produce blossom spurs, and will control the too luxuriant or rapid growth of the plant. Those shoots of a subordinate character, and not so strong, may be left growing; and this course persisted in, will constantly equalise the distribution of the sap, and keep the plants well balanced and symmetrical.

In forcing, a very moderate amount of heat must be allowed; for it is well known that the apple succeeds best in temperate climes. If a small amount of bottom-heat could be allowed during the earlier period of forcing, or until the blossom was set, it would no doubt be an advantage; after which period the root would require no extra stimulus, except the occasional aid of clear liquid manure. The bottom-heat, however, should not be above 70 degrees. The atmospheric treatment should much resemble that of cherry forcing, keeping up a very free circulation of air, with moist floors or others surfaces, and a very low night temperature. The forcing might commence at 50 degs. day heat, and be suffered to advance 2 degs. a week until 60 degs. was attained, beyond which it should seldom range, unless by sun heat. The night temperature should range from 40 to 45 degs. at first, advancing in a progressive way to 55 degs., which, for the most part, should be the maximum, except at the latter stages. The growth of the young wood would be a tolerably good criterion

of the mode of forcing : if this become attenuated, over-heating might reasonably be suspected. Under a proper system of forcing, it would be short-jointed. Syringing would be frequently necessary, except at the blossoming and ripening periods, when it must be entirely withheld. Liberal waterings must be given, especially when the fruit is swelling. It is well known what prejudicial effects are occasioned by drought at that period with the out-door apples. Liquid manure should be very frequently used, in a very weak state : clarified soot-water, with one ounce of guano to two gallons, would be found very eligible. During the whole of the process, the pots or tubs should be kept plunged, and some provision should be made to prevent the ingress of the worms.

The plants, when in a rest state, should receive an annual dressing on the wood, in order to keep down insects. Some lime-water, with two ounces of soft-soap to each gallon, and the addition of six ounces of flour of sulphur, would be excellent, brushing it into every crevice of the wood.

CULTIVATION OF THE APPLE AS A CIDER FRUIT.

It is not our intention to offer a thorough detail of all the practices which are pursued in the cider coun-

ties ; the limits of this work (were such at all desirable) would by no means permit such a course. Indeed, some of the practices in those districts are not such as can by any means be backed by first-rate horticulturists of the present day ; having arisen through mere expediency, and frequently betraying a lamentable ignorance of those first principles which it is absolutely necessary to understand in order to carry out any art to the perfection of which it is capable.

We will, however, advert occasionally to some of those practices, in order to throw additional light on the subject.

The subject will arrange itself under the following heads :—

- 1st. Preparation of orchard sites.
- 2nd. Mode of planting, distance, &c.
- 3rd. Under crops in the earlier stages.
- 4th. Pruning, top-dressing, renovation of decaying trees, &c. &c.

Preparation of Orchard Sites.—There is, we are given to understand, very little attention paid to the preparation of soils for orchards. Here is plain proof of how much these things are capable of improvement ; for if it is necessary to carry out a complete system of drainage for the ordinary agricultural crops, it

is surely equally so for a work which, when completed, is expected to endure for so many years ; which is so expensive in the outset, and which is capable of yielding so much profit if crowned with success.

We understand that, in the Worcester orchards, whatever drainage has taken place previously to establishing an orchard, is in general what has been carried out in the usual course of tillage : on which lands, and but seldom on grass or leys, orchards are established.

The first great matter at the outset, then, is thorough drainage ; for, although the apple affects a sound and rather adhesive loam, such must be on a very sound and somewhat dry bottom. A loam of this character, three feet in depth, on a dry and pervious bed of gravel, would be perfection itself, as regards the apple : such, however, can be seldom obtained.

About the various modes of thorough draining, we can say little here ; but merely add, that no system of open surface-gutters should be relied on : such may serve a temporary purpose, but in sour or over-retentive soils, something more is needed.

If the substratum is of a cold and barren character, means should be taken to prevent the trees forming tap-roots, and descending into this infertile medium. Any hard and imperishable material will suffice ; and the surface of this should rise a few inches above the

ordinary surface of the substratum. For of what use can it be to decoy the roots below this level? When they reach the sides of their prepared holes, they will of course be circumscribed like a flower in a garden-pot. We have known much ill-success in planting occur through this injudicious proceeding.

We think that land, after a moderate course of tillage, is in a fitter state, on the whole, for establishing an orchard, than old leys, especially if a thorough system of drainage has to be established. For although turf is a most desirable thing to imbed the apple roots in, yet the necessary porosity of the soil through raw organic matter, in abundance, might in dry periods subject the orchard to an inconvenient amount of drought; from which the well-tilled soil would comparatively escape. Soil in this state also furnishes an excellent opportunity for thorough drainage, and when this is completed, the centres between the lines of trees is directly available for either green or white crops; for hops, or for laying down to grass, if necessary.

Depth of soil is certainly a great essential in apple cultivation. It, however, so happens, that some "thin-skinned" loamy soils will grow very fine apples, providing no stagnation takes place at the root. When such is the case, we would advise by all means deepening the lines, where the apples are to be planted, at the expense of the adjacent ground. In such cases

the trees would stand upon the crown of a ridge, which should extend at least three feet on each side the tree, in the earlier stages of growth : this course will leave a deepened alley on each side, which, if the soil be sound and somewhat adhesive, will prove beneficial. This alley should retreat (if we may use the term) at frequent intervals, and of course drive away the plough or spade in a progressive way. If the orchard became very thriving, nearly a foot a year might be added to the exterior of the ridge; at least, after being planted about six or seven years. One thing we would insist on, and that is, that the three feet originally appropriated to the tree should not be cropped; or, if cropped at all, we would limit it to such crops as do not require the earth to be stirred above three inches in depth. It would be far better to lay it down in grass than to disturb the surface-roots any deeper. We are, however, informed by good authority, that young orchards under the farmer's care generally thrive better when kept broken, than in a rest state; at least, in the early stages.

By such a course, the apple might ultimately be made to "shake hands," as it is technically termed, of green crops all over the field; and in the end, one broad and deep excavation would be left between the centre of the rows, all through the orchard, which would serve as drainage and for passage.

With regard to laying the land down in grass be-

tween the trees, or planting on leys, it should be borne in mind that, if to be grazed, it is expensive and difficult to keep the trees protected from the cattle ; and as for mowing continually, it so exhausts the soil, that top-dressings of some kind will become necessary. Hops or green crops would, therefore, seem to be most eligible.

Before closing with this division of the subject, it will be well to repeat, that a sound and somewhat greasy loam is the most eligible for the apple. It matters little what the shade of colour be ; we would, however, prefer it of a bright yellowish brown, or of a hazel colour, and, by all means, of a uniform character. It is a well-known fact, according to the Hereford cultivators, that the same sorts from a lighter soil produce inferior cider to those on stiff soils. Pears, on the contrary, for perry purposes, do well on the lighter soils, and the perry is found to be of superior quality. Hence the finest cider and the finest perry are seldom found in the same localities.

Distance, Mode of Planting, &c.—No set distance is observed in the regular orchard districts ; the practice varies much in this respect. In many of the Worcester and Hereford orchards they are far too close. We should consider fifteen yards at least as necessary ; whereas in many orchards they will be found as close as sixteen or twenty feet.

When planted thus close the branches become so

interwoven, and covered with moss, that the fruit can scarcely be seen ; and these are, of course, very small and inferior. In the grass grounds of Gloucestershire, and by some superior cultivators on arable land in Herefordshire, they may be frequently met with at least twenty yards apart.

The mode of planting appears to be what is commonly termed the quincunx or angular mode : to this there need be no objection. As to the mode of planting the trees, very little ceremony is observed in general ; many are what gardeners would term stuck in, rather than planted.

We would advise some pains to be taken, however ; especially if the soil is not first-rate, and perhaps stubborn. In the latter case it would be necessary to open the holes in the autumn, and to let the excavated soil become mellowed through a long winter by the action of the frost. In addition, we would use a little mellow compost round each tree ; such as an old manure heap, composed of furrowings and manure, which has lain a long time, and has been turned and thoroughly blended. We would also add a little mulch on the surface, to protect the roots from drought, until the trees are established. The month of November is the best time, providing the soil is mellow and the land generally in order : when, however, this is not the case, the latter end of February would be preferable.

Under Crops in the Earlier Stages.—We before recommended at least fifteen yards distance as very eligible ; we would, however, advise a much wider distance between the lines or rows as breathing places, being persuaded that such will be found of immense utility. They will assist in setting the blossoms, will be in some degree corrective of the aptitude to gather moss, to which aged trees in confined situations are liable, and will moreover produce increased size and flavour in the fruit. The ground between will be of great service in regard of other matters, whether green or white crops. The kind of crop in use in the orchard counties, depends in part on the general economy of the farm, of which the orchard forms a part. We cannot help thinking, however, that green crops in general would be most eligible ; in the earlier stages, white or corn crops may be resorted to, but the increasing shade of the trees will ultimately render such crops too unproductive to be long persisted in. We should think that such land might be rendered of great service if constantly under green crops, providing manure could be spared for the purpose. Thus turnips, parsnips, carrots, the drumhead cabbage, the mangold wortzel, and potatoes, might alternate in a proper way, with perhaps occasionally a two years' rest in grass, which should be mowed and not eaten by cattle; for surely it would be a most desirable thing to exclude them altogether from the orchard. It

must be admitted that, when under grass, the early spring feed is very valuable; it has been found, however, that the trees do not make such rapid progress as when cultivation is carried on between the rows. In some parts, it is the custom to introduce the hop culture, and when this is the case, the hop-yard is in general commenced with the orchard; the hops being counted a much better nursery than tillage. This is continued until the trees attain an inconvenient size.

Taking, therefore, the exclusion of stock of all kinds as a guiding principle, we cannot but think that white or grain crops occasionally in the earlier stages, sinking finally into a well-planned rotation of green crops, with an occasional rest for a couple of years under grass, will, on the whole, be found the most profitable and convenient.

Pruning, Top-dressing, Renovation of Decaying Trees, &c.—The trees having been duly planted after a due training in the nursery, little pruning is needed in their earlier stages; as much, however, should be practised annually, as will cause the tree to form an expanding head, in proper form. To accomplish this, those trees which do not diverge sufficiently in their side branches, should have such pruned back for the first two or three years, taking care to cut to an eye placed where the branch is required to diverge

from. The trees at planting should be pruned rather close, making a selection of twigs so placed as to form the main fabric of the future tree ; and these should be shortened in planting to four or five buds each. Those trees which, from their own natural habit, become over-crowded with young sprays, should have a slight thinning occasionally in their earlier stages ; and in doing so, the middle of the tree should be kept rather open for a while, in order to admit light to solidify and strengthen the surrounding shoots, whilst the tree is in course of forming. We should consider that a little pruning would be beneficial every two years, even after the trees are established ; such, however, we fear, would by many be thought troublesome ; yet, when it is considered how light the task would be from its frequency, the objections will be found to possess little validity. Such pruning would be confined to the removal, in due time, of branches in thick parts of the tree, thwarting or chafing each other ; and to a light thinning of the superfluous sprays, in order to give stability to the different parts of the tree, and to facilitate the swelling of the fruit, which, when choked with competing shoots, can never attain to a due amount of perfection.

When the orchard has come into full bearing, very little pruning will be necessary ; it will for a few years almost prune itself. After a lapse of years, together with heavy crops, the trees will become rather languid ;

and at this period we would take extra steps to renovate and sustain the weakened constitution of the tree. Top-dressing now becomes necessary, and although not a matter of ordinary practice in the cider districts, yet one not the less necessary. We have known many a fine old tree sink by degrees unassisted; whilst, forsooth, young trees full of vigour, and from which the trouble and expense might well have been spared, were revelling in manures. As this is not a common practice, we will explain how we think it would be rendered practicable.

The mere shovellings of the fold-yard, or the slutch, would be excellent material for this purpose; such is generally rich in urinary matters, which would speedily be carried down by the rains to the roots. When the trees were to be renovated by such matter, it should be laid on several inches in thickness; and as such would require a good deal of manure, as well as labour, a few trees might be done each autumn.

We would pare off the turf from the surface of the roots four inches in thickness; and then lay on the manure, replacing the thick turves, in a light way. The turves should be cut in small squares of about six inches; this would afford numerous crevices for the rain to enter, in order to carry the properties of the manure to the roots.

In this way much valuable assistance might be afforded, which we have no doubt would be amply

repaid in the size of the fruit, together with the renewed constitution of the tree. To carry out, however, renovation principles to their utmost, some severe pruning would be necessary, as an adjunct to the top-dressing. This must consist in removing all inferior shoots which shew symptoms of premature decay—especially those with decayed points—and in encouraging the tree to bear more towards the extreme points, which in general retain their vigour longest in old trees.

The cutting away of main limbs should be avoided as much as possible ; this is in general productive of serious consequences to most fruit-trees ; and the late T. A. Knight, Esq., of Downton, was much opposed to the practice. The authority of such a person may well cause us to hesitate before carrying such pruning to any extent.

Concluding Remarks.—We have said nothing about nursery management, as the general principles will be found embodied in the former parts of this work. Before closing, however, we will endeavour to offer a few useful remarks on this head.

There are but few sorts of either apples or pears that extend widely over the cider districts : the sorts are for the most part local. Many farmers, after the cider or perry has been pressed from the pulp—then termed “*Must*”—lay it in drills in some spare corner

of the field, and hereby raise hundreds of seedlings; and many of these, if they grow kindly, are planted in the orchards, being first trained in the nursery to the required height, and their produce tried. If such are found worthless, they are of course grafted. As to farmers selecting their seeds, we believe that scarcely one in a hundred takes that trouble; there can be no doubt, however, that this should ever be regarded as one of the fundamental steps to be taken in order to perfect an orchard system.

Many of the old cider apples, which were esteemed in former days, are now rejected, being what is termed "worn out." Thus the following is a list from an excellent judge of orcharding, a friend of ours, in Worcestershire, which points to a class of the kind.

Door Apple	}	Old sorts, which should not be continued: they soon canker and decay.
Cook ditto		
Peach ditto		
London Pearmain		
Bricklin		
Old Russet		
John Apple		
Red Streak		
Foxwhelp	}	All new and good bearers.
Dalby's Kernel		
Lilley's ditto		
Dimmack ditto		
Captain's ditto		
Rushorth Pearmain		
Queen's Favourite		
Broughton's Kernel	}	
Jones's ditto		

Thus far Worcestershire ; and similar reports might be made of the other counties. This points at once to the necessity of improved practices, especially as to care in selecting seed from proper kinds ; and especially of sound constitution : instead of raising indiscriminately from the "Must."

We would advise all who are desirous of improving on the old practices, to be particular in their nursery management. We would carefully select our seed according to the maxims previously laid down ; we would sow it on soil of a fresh character, at least not in ground which had previously been occupied in like manner ; and at transplanting time, we would sort them into three distinct samples. First we would pick out all those possessing very stout and short-jointed wood, as being likely to produce occasionally good fruit without grafting. The second selection should include all that look healthy and strong ; and the third lot we would entirely reject as being the smallest, and thereby, probably, of delicate constitution. The latter, however, might be suffered to undergo another two years' probation in the nursery, if thought desirable.

It should be borne in mind in nursery treatment, that, in rearing standards with high stems, it is necessary to practise what is termed "snagging in" by nurserymen, that is, leaving a joint or two on each of the side shoots, previous to the full development

of the head, at pruning time. This is done to give strength and thickness to the main stem, and will accomplish the matter much better than by total stripping. As soon, however, as the head is fairly formed, these must be pruned close away to the bole, in a neat and workmanlike manner.

In speaking of distance in planting, we forgot to name one fact, which must at all times influence the distance ; that is, the quality and depth of the soil. It will be seen at a glance that these have a powerful influence on the ultimate size of the tree, as well as rapidity of growth.

As the trees are liable (where cattle are introduced to the orchard) to damage of different kinds, much precaution is necessary in guarding against it. It is a very good plan, adopted in some districts, of wrapping a straw or hay rope around the stem of the young tree; if these become injured, a smearing of tar would soon deter them from meddling farther. Some persons make up a nauseous mixture, composed of night-soil, lime, cowdung and water ; to which we would by all means add a little soft-soap—say three ounces to a gallon: this, beat up into a fine paint, may be plastered on with a brush. It should ever be borne in mind, however, that such mixtures have a tendency to stop the pores of the tree ; and if carried beyond a certain pitch, in point of adhesiveness, or of producing an

impervious skin, will become prejudicial to the welfare of the tree.

One great enemy to the orchardist's success remains to be noticed, viz., the American blight.* This, if suffered to establish a footing, will be productive of more evils than all the others. The first best maxim, is to resist its first attacks, be the trouble ever so great. If, however, it unfortunately establishes a footing, we know of no better remedy, providing the orchard is not too old, than a close pruning in November of all, or nearly all, the last year's shoots, and then to apply a paint (as before recommended for the attacks of animals) composed of urine, soft-soap, and lime; thickened, if necessary, with clay. Two ounces of soft-soap to a gallon of urine, thickened with clay and lime, will make a powerful mixture, and will, if persisted in, prove effective.

DISEASES.

DISEASE is the negation of health; and as the health of a plant is the correct performance of its functions, disease may be defined to be an incorrect performance of the functions. Such incorrectness arises from four causes—vital energy declining from old age—parasites—improper food, either in quality or quantity—and

* See section "INSECTS."

inauspicious temperature. If these could be all avoided, a plant might enjoy a vigorous immortality. Such, however, is not the lot of any organized being, and in proportion to the debilitating circumstances, are the nature, the intensity, and final consequences of the disease induced. The apple-tree is liable to distempers arising from each of those causes, and its distempers, owing to its value as a fruit-bearer, have been more watched and discussed than those of any other plant. The results from those discussions are not very luminous, nor does this afford a subject for surprise, vegetable nosology being one of the most obscure paths in the whole region of human knowledge.

Canker is the most common and the very worst disease to which the apple is liable. To what cause this is attributable is at present uncertain, or whether to a combination of causes. We have always noticed one thing, and that is, that severe disrootings or root cutting, seems at least to lessen its virulence. From this we are led to think, that immature wood, transferred from stock to stock, has a strong tendency to produce it. It is not improbable, too, that the individual character of the stock has something to do in the affair; for we have an instance under our eyes of a fact or two, which rather tend to give such an impression. In 1832 we found the Hawthornden cankering so badly—not one tree, but all—that we destroyed the stock, reserving, however, a healthy graft or two;

these we put into what we deemed at the time a healthy subject—a Hick's Fancy. Strange to say, the Hawthornden, which has branched and borne fruit in profusion ever since, has never to this day shewn a spot of canker, although the tree is growing in precisely the same soil, and prepared in the same way as the original Hawthorndens were. Now, either the stock or the vital action of the leaves of the Hick's Fancy has infused new life into the Hawthornden.

Again, we have generally found trees growing on ground of a wet and sour character, or a bad subsoil, very liable to this evil ; as also trees on exhausted soils.

As to the question of the wearing-out of races, about which there has been so much debate, we know for certainty that the apples so much praised for their qualities, in books of a century ago, are not the apples of to-day ; and we have no doubt that the same disagreement existed then as to the century previous. Where are all the old Codlings, for instance, or the Russets ? Who would be bold enough to lay down an orchard of the old English Codling, or of the old Pile's Russet ? Even the Ribston Pippin, the most popular favourite ever produced—even this is fast on the wane. There is no proof that apples are any better than they were a century ago ; therefore it is not the mere love of novelty alone which has led to the introduction of so many new sorts. However, be

the cause what it may, we must consider what may be done to avoid or alleviate it.

We do not think there is much truth in Mr. Beaton's theory, which will be found in a preceding portion of this work ; viz., that a good stock having been found, it would be advisable to procure all our stocks by means of cuttings of the roots of such stock. In the next place, we advise thorough drainage, and the use of fresh loam. These are steps in the right direction, for if they have not a tendency towards the obliteration of the canker, they will at least conduce to the health and permanency of the tree.

Another point to which we would direct attention, is the placing impervious bottoms as interceptors between the soil and subsoil ; and avoiding deep soils enriched by manure. In recommendation of this practice, we may be permitted to state that we have more than a hundred trees which have been thus treated, at various periods, within the last twenty years ; and that the amount of canker with us is so trifling, that it scarcely deserves consideration at all. We make a point of thinning out all superfluous shoots every winter ; however, by the shallow border or dwarfing system, there is not a great amount of labour of this kind to perform. Ripening of the wood we conceive to be a principle of much importance, even with the natives of temperate climates ; and, although high and exciting modes of cultivation may flatter for awhile by

specious appearances, it is a grave consideration whether they do not carry serious evils in their train.

Quite consonant with our opinion that deficient ripeness of the wood of the young apple is a prime predisposing cause of the canker, is the experience and practice of Mr. Williams, of Pitmanston.

To preserve the Golden Pippin and other apples free from canker, Mr. Williams recommends every year pruning away as much of each shoot of young wood as is not perfectly ripened, which, he says, will preserve the tree as perfectly free from canker as any new variety. The best stock for the Golden Pippin he finds to be the Siberian Crab, because, as the shoots of this crab cease to elongate after the month of August, the roots become less active in propelling the upward sap; hence the wood and buds of the grafts are more perfectly ripened in the autumn. (*Trans. Hort. Soc.* vi. *art.* 64.)

The late Mr. Knight, no mean authority upon all things relative to the apple, observes that the canker is always found in those varieties which have been long in cultivation, and in these it annually becomes more destructive, and evidently arises from the age of the variety; but it often appears to be hereditary. A gravelly or wet soil, a cold preceding summer, or a high, exposed situation, adds much to its virulence. It is most fatal to young free-growing trees of old varieties; and every gardener must have noticed often

the strong shoots of these totally destroyed by it, when the old trees growing in the same orchard, and from which the grafts had been taken, were nearly free from the disease. The latter have ceased to grow larger, but continue to grow well, if not of very old kinds of fruits. The young stocks, by affording the grafts a preternatural abundance of nourishment, seem, in this instance, to have brought on the disease; and Mr. Knight states that he always found that transplanting, or a heavy crop of fruit, which checked the growth of the tree, diminished its disposition to canker. In middle-aged trees of very old kinds a succession of young shoots is annually produced by the vigour of the stock, and destroyed again in the succeeding winter: the quantity of fruit these produce is, in consequence, very small. In this disease something more than a mere extinction of vegetable life appears to take place. The internal bark bears marks of something similar to erosion, and this Mr. Knight originally believed to be the first seat of the disease; but subsequent observation satisfied him that the canker is a disease of the wood, and not of the bark, and led him to the conclusion that canker is never a primary or merely local disease, but arises from the morbid habit of the plant, and to be incurable by any topical application. (*Knight on the Apple*, 10.)

This last opinion is very contrary to the opinion of the mere empirical gardener; for, whatever may be the

disease under which a plant is suffering, it is too usual for him to confine his attention to the part immediately affected. It is looked upon as a strictly local derangement, and the remedies are as erroneously topical.

To consider that because a bud, a branch, or a root is diseased, that the cause of the disorder is to be sought for there, is as sensible as to suppose that every local pain endured by the human frame arises from a disorganization of that part. On the contrary, we know that the diseases of animals arise almost universally from the stomach; and, as Addison remarked, "that physic is generally the substitute for temperance or exercise." The functions of the stomach, by whatever cause deranged, render digestion imperfect, and the secretion defective; the bile is superabundant or deficient in quantity, and head-ache is the result; the liver is diseased, and it causes a pain the most acute between the shoulders; the blood is ill elaborated, and eruptions are thrown out on the surface of the body. With plants it is the same. It may be laid down as an axiom, without exception, that all vegetable diseases, unpreceded by external injury, arise from the ill-prepared state of the sap—a state brought about conjointly or separately by the improper food imbibed, and the deranged digestive power of the leaves and other organs. That this is so will not appear strange, when we reflect, that from the sap all parts of the plant are formed, and are conti-

nually increased in number and size. The solid substance of the wood, and the temporary tender blossoms, are alike extracted from that circulating fluid. If the constituents for these are wanting, or if improper components are introduced, or if the sap is too watery, disease is the necessary consequence. Disease, which in youth and manhood usually arises from intemperance and over-excitement, visits old age as a consequence of its decayed vital powers; and, "if the silver chord has not been loosed," or "the golden bowl broken," by the short-sighted indulgence of early years, man gradually declines into the grave, as the vital organs cease to perform their office, because the limit of existence natural to his species has been attained. Some diseases peculiar to old age are prematurely induced in the usually vigorous period of life by licentious indulgences, individual or hereditary. Ossification of the vascular system is an example. In the vegetable part of the creation, the *canker* or *ulcer*, to which our apple, pear, elm, and other trees are subject, is a somewhat parallel instance. This disease is accompanied by different symptoms, according to the species of the tree which it infects. In some of those whose true sap contains a considerable quantity of free acid, as in the genus *Pyrus*, it is rarely accompanied by any discharge. To this dry form of the disease it would be well to confine the term *canker*, and to give it the scientific name of *Gangræna sicca*. In other trees,

whose sap is characterized by abounding in astringent or mucilaginous constituents, it is usually attended by a sanious discharge. In such instances, it might strictly be designated *ulcer*, or *Gangræna saniosa*. This disease has a considerable resemblance to the tendency to ossification which appears in most aged animals, arising from their marked appetency to secrete the calcareous saline compounds that chiefly constitute their skeletons. The consequence is an enlargement of the joints, and ossification of the circulatory vessels and other parts, phenomena very analogous to those attending the cankering of trees. As in animals, this tendency is general throughout their system ; but, as is observed by Mr. Knight, “like the mortification in the limbs of elderly people,” it may be determined as to its point of attack, by the irritability of that part of the system. This disease commences with an enlargement of the vessels of the alburnum of a branch, or of the stem. This swelling invariably attends the disease, when it attacks the apple tree. In the pear the enlargement is less, yet is always present. In the elm and the oak sometimes no swelling occurs ; and in the peach we do not recollect to have seen any. We have never observed the disease in the cherry tree, nor in any of the pine tribe. The swelling is soon communicated to the wood, which, if laid open to view on its first appearance, by the removal of the bark, exhibits no marks of disease

beyond the mere unnatural enlargement. In the course of a few years, less in number in proportion to the advanced age of the tree, and the unfavourable circumstances under which it is vegetating, the swelling is greatly increased in size, and the alburnum has become extensively dead; the superincumbent bark cracks, rises in discoloured scales, and decays even more rapidly than the wood beneath. If the canker is upon a moderately-sized branch, the decay soon completely encircles it, extending through the whole alburnum and bark. The circulation of the sap being thus entirely prevented, all the parts above the disease of necessity perish. In the apple and the pear the disease is accompanied by scarcely any discharge; but in the elm this is very abundant. The only chemists who have examined these morbid products are Sir H. Davy and Vauquelin; the former's observations being confined to the fact, that he often found carbonate of lime on the edges of the canker in apple-trees.*

Vauquelin has examined the sanies discharged from the canker of an elm with much more precision. He found this liquor nearly as transparent as water, sometimes slightly coloured, at other times a blackish brown, but always tasting acrid and saline. From this liquor a soft matter, insoluble in water, is deposited upon the sides of the ulcer. The bark over

* Elements of Agric. Chemistry, 2nd ed. p. 246.

which the transparent saries flows attains the appearance of chalk, becoming white, friable, crystalline, alkaline, and effervescent with acids. A magnifier exhibits the crystals in the forms of rhomboids and four-sided prisms. When the liquid is dark coloured, the bark appears blackish, and seems as if coated with varnish. It sometimes is discharged in such quantities as to hang from the bark like stalactites. The matter of which these are composed is alkaline, soluble in water, and with acids effervesces. The analysis of this dark slimy matter shews it to be compounded of carbonate of potass and ulmin, a product peculiar to the elm. The white matter deposited round the canker was composed of—

Vegetable matter . . .	60.5
Carbonate of potass . . .	34.2
Carbonate of lime . . .	5.0
Carbonate of Magnesia . .	0.3
	<hr/>
	100.0

Vauquelin calculated from the quantity of this white matter that was found about the canker of an elm, that 500lb. weight of its wood must have been destroyed.* There is no doubt that such a discharge is deeply injurious to the tree; but the above learned chemist appears to have largely erred, for he calcu-

* *Annales de Chimie*, **xxi**, 30.

lated from a knowledge of the amount of the saline constituents in the healthy sap, whereas in its diseased state these are much and unnaturally increased. We once were of opinion, that this disease does not arise from a general diseased state of the tree, but that it is brought on by some bruise or injury, exasperated by an unhealthy sap consequent to an unfavourable soil, situation, and culture ; but more extensive and more accurate examinations convince us that the disease is in the tree's system ; that its juices are vitiated ; and that disease will continue to break out independent of any external injury, so long as these juices continue peccant and unaltered. This conclusion will be justified, we think, by the preceding facts, as well as by those distributed through the following pages.

The disease is not strictly confined to any particular period of the tree's age. We have repeatedly noticed it in some of our lately introduced varieties that have not been grafted more than five or six years ; and a writer in the *Gardener's Magazine*, vol. 5, p. 3, states, that the trees in his orchard, though "only of four years' growth, are sadly troubled with the canker." Although young trees are liable to this disease, yet their old age is the period of existence most obnoxious to its attacks. It must be remembered, that this is not consequently a young tree which is lately grafted. If the tree from which the

scion was taken be an old variety, it is only the multiplication of an aged individual. The scion may for a few years exhibit signs of increased vigour, owing to the extra stimulus of the more abundant supply of healthy sap supplied by the stock ; but the vessels of the scion will, after the lapse of that period, gradually become as decrepid as the parent tree. The unanimous experience of naturalists agrees in testifying that every organized creature has its limit of existence. In plants it varies from the scanty period of a few months, to the long expanse of as many centuries ; but of all, the days are numbered ; and although the gardener's, like the physician's skill, may retard the onward pace of death, he will not be permanently delayed. In the last periods of life, they shew every symptom that accompanies organization in its old age,—not only a cessation of growth, but a decay of former development, a languid circulation, and diseased organs.

The canker, as already observed, attends especially the old age of some fruit trees, and of these the apple is most remarkably a sufferer. “I do not mean,” says Mr. Knight, “to assert that there ever was a time when an apple tree did not canker on unfavourable soils, or that highly cultivated varieties were not more subject to the disease than others, where the soil did not suit them. But I assert, from my own experience and observation within the last twenty

years, that this disease becomes progressively more fatal to each variety, as the age of that variety, beyond a certain period, increases ; that if an old worn-out orchard be replanted with fruit trees, the varieties of the apple which I have found in the catalogues of the middle of the seventeenth century, are unproductive of fruit, and in a state of debility and decay.”*

Among the individuals particularly liable to be infected, are those which have been marked by an excessively vigorous growth in their early years. We once had one which for the first twelve years of its existence was remarkable for the unnatural large size and abundance of its annual shoots. It then became grievously affected by canker, which at length destroyed it.

Trees injudiciously pruned, or growing upon an ungenial soil, are more frequently attacked than those advancing under contrary circumstances. The oldest trees are always the first attacked of those similarly cultivated. The Golden Pippin, the oldest existing variety of the apple, is more frequently and more seriously attacked than any other.

The soil has a very considerable influence in inducing the disease. If the subsoil be a ferruginous gravel, or if it is not well drained, and the soil be aluminous, and effective means are not adopted to

* Some doubts as to the Efficacy of Mr. Forsyth's Plaster by T. A. Knight, Esq. P.L.H.S., &c., 1802.

free it of superabundant moisture—the canker, under any one of these circumstances, is almost certain to make its appearance amongst the trees they sustain, however young and vigorous they were when first planted.

How inductive of this disease is a wet retentive subsoil, if the roots penetrate it, appears from the statement of Mr. Watts, gardener to R. G. Russell, Esq., of Chequer's Court, in Buckinghamshire. A border beneath a south wall had a soil three feet and a half in depth, apparently of the most fertile staple, twice re-made under the direction of the late Mr. Lee, of the Vineyard, Hammersmith. In this the trees, peaches and nectarines, flourish for the next three or four years after they are planted, but are then rapidly destroyed by the canker and gum. The subsoil is a stiff sour clay, nearly approaching to a brick earth; and the disease occurs as soon as it is reached by the roots of the trees.*

Mr. Forsyth concluded that the soil is not always the source of the disease, because it universally and invariably appears at first in the branches, and proceeds thence towards the roots of the tree. But this is certainly not a conclusion warranted by the premises, because the acidity of the sap, whatever may be its source, would be likely to injure and corrode,

* Gardener's Magazine, vi. 617.

in the first instance, those parts where the vessels are the most weak and tender ; now these, past dispute, are in the branches. Moreover, we generally see the youngest branches the earliest sufferers.

Pruning has a powerful influence in preventing the occurrence of the canker. We remember a standard russet apple tree, of not more than twenty years' growth, with a redundancy of ill-arranged branches, that was excessively attacked by this disease. We had two of its three main branches and the laterals of that remaining carefully thinned ; all the infected parts being at the same time removed. The result was total cure. The branches were annually regulated, and for six years the disease never re-appeared. At the end of that time the tree had to be removed, as the ground it stood upon was required for another purpose.

All these facts unite in assuring us that the canker arises from the tree's weakness, from a deficiency in its vital energy, and consequent inability to imbibe and elaborate the nourishment necessary to sustain its frame in vigour, and much less to supply the healthy development of new parts. It matters not whether its energy be broken down by an unnatural rapidity of growth, by a disproportioned excess of branches over the mass of roots, by old age, or by the disorganization of the roots in an ungenial soil ; they render the tree incapable of extracting sufficient nou-

ishment from the soil, consequently incapable of developing a sufficient foliage,* and therefore unable to digest and elaborate even the scanty sap that is supplied to them.

The reason of the sap becoming unnaturally saline appears to be, that in proportion as the vigour of any vegetable declines, it loses the power of selecting by its roots the nourishment congenial to its nature. M. Saussure found, in his experiments, that the roots of plants, growing in saline solutions, absorbed the most of those salts that were injurious to them, such as sulphate of copper, evidently because the declining plant lost the sensitiveness and energy necessary to select and to reject.

M. Saussure also found, that, if the extremities of the roots were removed, the plants absorbed all solutions indiscriminately.†

An ungenial soil would have a debilitating influence upon the roots in a proportionate, though less violent, degree than the sulphate of copper, and as these, consequently, would absorb soluble bodies more freely, and without that discrimination so absolutely necessary for a healthy vegetation, so the other most essential organs of nutrition, the leaves of the weakened

* No symptom of a cankered tree is more invariable than a deficiency of leaves.

† Saussure's *Recherches Chimiques sur la Vegetation*, 260.

plant, would promote and accelerate the disease. These, reduced in number and size, do not properly elaborate the sap ; and we have always found that, under such circumstances, these stunted organs exhale the aqueous particles of the sap very abundantly, whilst their power of absorption is greatly reduced. The sap, thus deficient in quantity, and increased in acidity, seems to corrode, and affect the vascular system of the tree in the manner already described.

These facts afford us most important guides in attaining the desired objects, the prevention and cure of the disease.

If superluxuriance threaten its introduction, the best remedy is for the cultivator to remove one of the main roots of the tree, and to be particularly careful not to add any fertile addition to the soil within their range. On the contrary, it will be well, if the continued exuberant growth shews its necessity, for the staple of the soil to be reduced in fertility by the admixture of one less fertile, or even of drift sand.

If there be an excess of branches, the saw and the pruning knife must be gradually applied. It must be only trees of very weak vital powers, such as is the Golden Pippin, that will bear the general cutting of the annual shoots, as pursued by Mr. Williams. A new vigorous variety would exhaust itself, the following year, in the production of fresh wood. Nothing beyond a general rule for the pruning can be laid

down, and it amounts to no more than the direction to keep a considerable vacancy between every branch, and the branch above or beneath it ; and especially to provide, that not even two twigs shall chafe against each other. The greater the intensity of light, and the freer the circulation of air amongst the foliage of the tree, the better the chance for its healthy vegetation and ripening.

If the disease, being in a fruit tree, be a consequence of old age, it is probably a premature senility, induced by injudicious management, for very few of our varieties are of an age that insure to them decrepitude. We have never yet known a tree, unless it was in the last stage of decay, that could not be recovered by giving it more air and light, by careful heading in, pruning, improvement of the soil, and cleansing the bark.

If the soil, by its ungenial character, induces the disease, the obvious and only remedy is its amelioration ; and if the subsoil is the cause of the mischief, the roots must be prevented striking into it. In all cases, it is the best practice to remove the tap-root. Many orchardists pave beneath each tree with tiles and broken bricks. If the trees are planted shallow, as they ought to be, and the surface kept duly fertile, there is not much danger of the roots striking into the worse pasturage of the subsoil. On this point, the experience of Mr. W. Nichol, the gar-

dener at Newick Place, in Sussex, agrees with our own. He says that the canker may be avoided in most instances by paying proper attention to the soil in which the tree is planted. Canker, he thinks, will seldom occur if the surface-soil is good, for in that case the roots will never descend into the prejudicial subsoil, but spread out their radicles near the surface, where they find food most abundant. If this is not kept up, the roots descend into the obnoxious substratum, and the disease assuredly follows.*

It remains for us to detail the course of treatment that we have always found successful in effecting a cure in any variety not decrepit from age, if the canker has not spread to the roots.

Having completely headed down, if the canker is generally prevalent, or duly thinned the branches, entirely removed every small one that is in the least degree diseased, and cut away the decayed parts of the larger, so as not to leave a single speck of the decayed wood, we cover over the surface of each wound with a mixture, whilst in a melted state, of equal parts tar and resin, applying it with a brush immediately after the amputations have been performed, taking care to select a dry day. We prefer this to any composition with a basis of cow-dung and clay,

* Baxter's Library of Agric. and Hortic. Knowledge, 3rd Edit. 22.

because the latter is always more or less absorbent of moisture, and is liable to injury by rain and frost, causing alternations of moisture and dryness to the wounds, that promote decay rather than their healing, by the formation of new wood and bark. The resinous plaster seldom or never requires renewal. Mr. Forsyth, the arch advocate of earthy and alkaline plasters, finding that they promoted decay, if applied to the wounds of autumn-pruned trees, recommends this important act of cultivation to be postponed to the spring. If a resinous plaster be employed, it excludes the wet, and obviates the objection to autumnal pruning. Mr. Forsyth's treatment of the trunks and branches of trees, namely, scraping from them all the scaly, dry exuviae of the bark, is to be adopted in every instance. He recommends them to be brushed over with a thin liquid compound of fresh cow-dung, soap-suds, and urine ; but we very much prefer a brine of common salt. Each acts as a gentle stimulus, which is their chief cause of benefit ; and the latter is more efficacious in destroying insects, and does not, like the other, obstruct the perspiratory vessels of the tree. The brine is advantageously rubbed in with a scrubbing, or large painter's, brush. Some persons recommend a liquid wash, containing, as prominent ingredients, quick-lime and wood ashes, which, as the disease arises from an over-alkalescent state of the sap, cannot but prove injurious, and aggravate the disease.

Mr. Forsyth, formerly gardener at Kensington Palace, made a considerable sensation at the close of the last, and at the commencement of the present, century, by the wonderful effects produced upon trees, as he asserted, by the following composition, used as a plaster over the wounds from which the decayed or cankered parts had been cut out :—

One bushel of fresh cowdung.

Half a bushel of lime rubbish ; that from ceilings of rooms is preferable, or powdered chalk.

Half a bushel of wood ashes.

One sixteenth of a bushel of sand ; the three last to be sifted fine. The whole to be mixed and beaten together until they form a fine plaster.*

Mr. Knight, in a very able and sarcastic pamphlet, published in 1802, entitled “ Some doubts relative to the Efficacy of Mr. Forsyth’s Plaster,” fully exposed the quackery—perhaps falsehood may not be too harsh a term—of this horticulturist’s statements.

Mr. Forsyth received a parliamentary grant of money for his discovery ; but this, as Mr. Knight observes, “ affords a much better proof that he was paid for an important discovery than that he made one.”

“ Should the public,” continues this distinguished

* Forsyth’s Observations on Fruit Trees, p. 68.

physiologist, “believe that an old dying tree can be restored to youth and vigour, merely by being plastered with lime, cow-dung, and wood ashes, and that a piece of such tree may by such means be made immortal, I think it would be a good speculation for some enterprising genius, in imitation of the quack doctors of the sixteenth century, to bring forward a nostrum to restore and perpetuate youth in the human subject. Should such a projector join Mr. Forsyth, and the one undertake the animal, and the other the vegetable world, under Dr. Anderson’s patronage, I will venture to predict that the success of each in the cures they perform will be equal.”

It has been very ingeniously suggested, that, if a destruction of the bark by external violence, and, consequently, likely to terminate in canker, has occurred, it would be a good plan to insert, as in budding, a piece of living bark, exactly corresponding to the excision, from a less valuable tree.

In conclusion, we would enforce upon the orchardist’s attention the importance of obtaining his grafts or buds from trees not affected by the disease, because, apparently, it is hereditary ; and, although after-cultivation may eradicate the malady, it is always far better to avoid the infection than to have to employ a remedy. (*Johnson’s Principles of Gardening*, 295.)

Russet or Brown Scurf.—This imperfection of the

fruit of the apple tree is a thickening, hardening, and discoloration of its skin in a patch or patches, attended by a roughness of its skin. A distortion of the fruit and a diminution of its pulp or flesh is the consequence. Similar blotches occur upon the peach, as mentioned in our volume on that fruit, p. 176. The cause appears also to be the same in both instances, viz. exposure to sudden transitions of temperature. Mr. Williams, of Pitmaston, concurs in this opinion. He says that the alternating temperature, light, shade, dryness and moisture, which occur many times in the course of a day, when July and August are showery, are the causes of apples becoming bronzed with russet, an opinion to which he arrived after lengthened observations during many seasons. Continued rain, preceded and followed by a cloudy sky, does not seem to produce the same effect ; but the sudden intense light which commonly succeeds a shower at the time when the fruit is wet, injures the skin, and occasions small cracks, which, when viewed through a magnifying glass, resemble the cracked surface called the network of the melon. If the injury is greater, the surface turns nearly black in spots or patches. A further injury occasions the crack to become deeper, and enters the solid flesh of the apple ; but if this happens in an early stage of growth, the surface of the crack becomes dry and hard ; and if the injury is done when the fruit is nearly ripe, it rots. These accidental

injuries of the skin in the early part of the growth of the fruit, nature patches up in the way we see ; but this new surface is never like the original skin ; it allows the aqueous portion of the pulp of the fruit to escape more freely by evaporation ; hence there is a little shrinking in the part where it happens, and the juices become richer by a kind of inspissation. (*Trans. Hort. Soc.* vii. 505.)

Apple Gangrene.—We have observed a peculiar disease affecting the fruit of the apple late in the autumn, and early in the winter of 1846, and less frequently in the autumn of the present year. The interior pulp becomes brown, but of a flavour more resembling that of a ripe medlar, rather than of that bitterness so striking in a decayed apple. Another very marked characteristic of this disease, is the blackness of the outer skin. The smell of the fruit is rather vinous when cut, and somewhat resembling that of a baked apple. It comes on suddenly, and does not appear to be confined to any particular variety or district, but seems to have been only observed upon the paler and looser-textured kinds. It attacked the Cats-head in Norfolk, and the Gravenstein in Hampshire.

Moss, as it is popularly called, is a certain indication that the stems and branches on which it prevails are too freely supplied with moisture, and

too much shaded. Among the small parasitical and cryptogamic plants, constituting the moss on apple trees, are the following:—*Spiloma melanopum*, appears in the form of sooty spots. *Borrera chrysophthalma*, orange-coloured and bushy. *Tortula fallax*, in light green tufts. *Leneodon scinroides*, creeping dark green tufts. *Fonaria hygrometrica*, pale green tufts. *Orthotrichum affine*, pale green tufts. *Hypnum lutescens*, yellowish green patches; besides others still more common.

The procedure which will radically remove mossiness, is to drain the soil thoroughly, and to thin the trees to wider intervals if too close. If the branches are also too crowded, they must be gradually pruned and reduced in number.

With regard to local remedies for the immediate removal of these parasites, the branches and stems should be scraped, and then scrubbed with a strong brine made by dissolving common salt in water. It should be so strong that an egg will float in the liquor.

Mr. G. Watson, of Norton Vicarage, near Stockton-on-Tees, recommends the use of lime.

This is a very old remedy, and, in our opinion, a very bad one, for the alkaline quality of the lime promotes canker, and the lime itself clogs the pores of the bark. The glaring white colour it imparts to the trees is very disagreeable to the eye, and if this be

diminished by the addition of soot, the pores are still more injuriously plastered up.

Mr. Watson's mode of applying it is the following : —A common water-barrel, placed on a wheel-barrow, is best suited for the purpose, and it should be filled as full of water as a person can conveniently wheel it. Put in plenty of quicklime, as water will only take up a certain portion; it cannot be made too strong, but it should not be so thick as to prevent its being applied with a syringe, having a coarse rose. Mr. Watson thinks it is best to wheel it immediately to the trees, even when warm, which it will be by the slacking of the lime. It will be necessary for one person to keep stirring it while another syringes the trees; by this means a portion of the lime is carried with the water, and adheres to the trees. (*Gard. Chron.* 1843, 158.)

The Mistletoe is a parasite, undoubtedly injurious to the apple tree, and should never be allowed to grow on any valued variety. Many persons, however, like to see it on the otherwise leafless branches during winter, and it may be induced to grow on them by raising a small tongue of the bark early in the spring, on the under side of a branch, and inserting between the wood and the tongue a seed of the mistletoe.

CALENDAR.

IN drawing up a calendar of culture to run through the greater part of the year, we would wish it to be understood, as a preface, that whatever remarks are here made are intended to apply chiefly to the culture of the apple in kitchen gardens ; and although there is, of course, an identity of principle, as far as root-management is concerned, as also thinning and pruning, with those under orchard culture, yet we think it will be most desirable to give our observations a special character, and to make them as far as possible apply to the apple under the various artistical modes of training now in use. These, it is well known, are various, as we have exemplified in the preceding portion of the volume on the apple ; and although to treat the matter at large would require too much space for the limits assigned us, yet we hope so to simplify the general principles as to enable every person, however unpractised, to modify and shape his course consistently with the kind and mode of training.

JANUARY.

Whatever we can recommend for the apple, whether with regard to root or top management, in January, might be nearly as well performed either a month earlier or a month later. We deem it necessary to

say thus much, in order to give our readers some latitude for these operations, for the leisure period of one person is not at all times the same as that of another. Thus much for monthly arrangement of these matters.

Planting and pruning are now the chief operations, providing the weather is open with regard to the former. As a general maxim, however, we would say plant in the succeeding month, if it has been neglected at the best period, which, providing all things are properly arranged, we hold to be the early part of November.

Whatever pruning may be necessary should, however, proceed without delay; and this process is by no means unimportant. The future form of the tree, as well as a fructiferous habit, from the soil upwards, are matters of prime consideration to those who aim at a dwarfing system, which in modern gardening is found to produce more good fruit in less compass than the old and irregular mode. The fruit of the better table kinds is found to be, moreover, of superior quality; and the matter does not end even here: first-rate vegetables may be grown within a few feet of trees thus circumstanced; whilst under the old and unsystematic mode of sticking trees in any how, and leaving them to themselves, the production of both fruit and vegetables was rather precarious, and the latter generally of inferior character.

We will commence with ordinary rough espalier or dwarf standard. Young plants, or "maidens," as they are termed in the nurseries, which have been recently planted, should be headed rather closely back the first season. The main object, indeed, in this and the succeeding year, is to establish the future form of the tree, which is at this period easily controlled as to any desired shape. The exterior of such tree should of course be formed first, for if strong interior shoots be allowed to prevail, all efforts to produce a proper form will prove abortive. The trees for rough espaliers should therefore take what is termed by practical men "the punch-bowl shape," or the character of what the florist deems good form in the tulip. All interior shoots must be entirely removed at this period; and what exterior shoots are suffered to remain must either stand well as to the end in view, or be shortened back, in order to obtain more shoots in the next year to take the proper position. If the trees are "maidens," they must be pruned back to about four or five buds on each remaining shoot. If they have been planted a year or two, there will be plenty of shoots to select from, and the young wood may be left upwards of nine inches in length: if more is left, the shoots of many kinds will not become duly clothed with fruit-bearing spurs; and when these matters receive proper attention

the tree will be a mass of spurs from within a foot of the ground to the extremities of the shoots.

In down-training from a main stem, a much greater length of shoot may be left, providing the main stem has been formed to the desired height. Indeed, there is no occasion to shorten at all here: the young shoots may be turned down their full length at once, cutting away all those which are badly placed, and any superfluous spray.

In all other fancy modes of training, the main purpose and ultimate position of the shoots must be kept steadily in view from the first; remembering that bearing fruit is no part of the object in the earlier stages, but the establishing a good form; and it is for this latter reason that severe pruning becomes necessary.

The pruning of ordinary standard trees may now proceed. This resolves itself into thinning out, and the removal of any decaying portions. Care should be taken, in thinning the interior of such trees, to distinguish between watery shoots and wood clothed with spurs. The latter must by no means be removed, but if it produces an inconvenient amount of spray, such may be shortened back to a single eye or bud. The blossom buds in the interior of the tree will produce fruit in bad springs, when that on the exterior and better-placed wood suffers by the frost.

When standard trees are becoming somewhat exhausted, a very liberal use of the knife, and sometimes of the saw, is necessary ; for when they can no longer support the whole volume of the top, some portion must be removed, in order to strengthen the rest. When such is the case, a strict adherence to any particular form must cease, and those limbs alone should be reserved which still shew signs of vigour.

FEBRUARY.

Planting, which had been suspended on account of severe weather, must be resumed towards the middle of this month ; we would by no means throw this operation into March, if it can be avoided. With planting, mulching will become necessary ; and those trees which were planted in the autumn, if not mulched, should instantly receive a coating. This is a very important operation, whether with regard to young trees or very old ones. It encourages a rapid action of root in newly planted trees, and shields them from the vicissitudes of a drying wind, or a scorching sun. In old or over-borne trees it is equally of benefit, and should be applied early in the autumn, if possible ; at which period, the very slutch of the manure yard may, in common with the dung, be spread over the roots of such trees six inches in thickness, with much benefit.

Pruning and training operations must now be com-

pleted as soon as possible, and any renovation of soil considered necessary, should at this period have particular attention.

MARCH.

The American bug or blight is the greatest pest of the apple, and is so notorious as to need no description here. We would merely direct attention to its habits, for it will, after appearing dead or dormant, shew signs of revival at this period. We know of no better recipe for the extirpation of this pest than a thorough brushing by hand of every part of the tree, using a mixture which we will shortly describe. Before the brushing, however, the young shoots which are infested should be removed by pruning, for unless this is done, it will be difficult to search every part of the tree. The mixture we use, and which we have found effectual, is thus made:—Three ounces of soft-soap is beat up in as small a quantity of water as possible, a quart at least of fresh lime is added to this, and three handfuls of sulphur. When the whole is well mixed, we pour it into one gallon of stale urine, and add as much pure clay as when well beat up will make a thick paint. This well rubbed in, will remain on the trees for twelve months, and will destroy the bug wherever brought in contact with it.

When the mixture has become dry on the trees,

it will assume a whitish colour, and it will then be readily perceived what parts have not taken the mixture. A second application will search every crevice, laying it on thickly where deep clefts or hollows occur.

Moss may be removed by a good brushing with horse urine. We are informed by a respectable gentleman, that Dr. Darwin, of Shrewsbury, has used it extensively, and found it an excellent application, as it entirely clears moss, and quite renews the constitutional vigour of the trees.

APRIL.

Little can be done for the apple in this month, excepting taking care to complete any previous directions which may be in arrears. We would again direct attention to mulching newly planted trees, if not already done. Towards the end of this month the sun will possess much influence on the soil, and, accompanied with drought, will prevent the young trees from gaining a good start. The mulching will obviate these difficulties.

MAY.

The great business in this month is taking care of the blossoms, either in the way of protection or in picking the caterpillars out of the clusters; for they are sure to come sooner or later: no season is entirely free from them. In the early part of the month,

when the blossoms begin to open, it would be well to devise some protection to valuable kinds of table fruit. This is easily accomplished with those under espalier training. Mats, or, what is better, coarse canvass or bunting, may be hung on the rails in the evening, and removed in due time the next morning. This will, however, only be necessary when frost threatens. The trees, as before observed, should be carefully hand-picked in the end of the month ; taking care to crush the caterpillar, and to dislodge the clustered leaves. If any of the aphides appear, we would advise a good syringing with tobacco water; three-quarters of a pound of strong shag tobacco to a gallon of water.

JUNE.

In the course of this month the young spray will begin to extend, and now it is that (on the old maxim, "prevention is before cure") we would recommend a careful attention to disbudding in due time. We are well aware that this is not commonly practised : this is not however from any objection to the principle, but few gardeners can find time for the operation at this busy period. Possessors of little gardens, and the amateur, have in general more time to devote to such matters, and to such we would specially direct our observations on this head. It is not well to disbud or totally remove all shoots which may be considered superfluous at this period ; such would tend,

in young or recently planted trees, to paralyze the action of the root. The best plan is to use the finger and thumb on all such, towards the end of this month, when they are about six inches in length : this will prevent the energies of the tree from being directed into a wrong channel, and tend to fructify the remaining branches, by admitting an increased amount of light. If any of the young trees in course of training possess leading young shoots which have taken a wrong direction, such may be disbudded altogether, providing another young shoot can be selected of some strength, and which has a tendency to assist in completing the general form of the tree.

In the early part of June, and indeed until Midsummer, much attention is necessary as to destroying caterpillars, and carrying on the picking operations suggested for May. If any of the trees begin casting their fruit, it may be considered indicative of either draught or feebleness of constitution ; generally the former ; and the best remedy is to give the tree a thorough soaking of water, to which some guano or other manure should be added. When valuable kinds have set too thick, they should receive a light thinning in the fruit, in the end of June ; this will assist the tree much both as to the present crop and its future stability.

JULY.

A continuation of the same process as recommended for June may be carried through the month of July. In addition to this, where the trees have made very long shoots, the principal ones may have their points pinched off, when the shoots have extended over a foot in length. This will tend to solidify them, and to divert the sap to the inferior parts of the tree, and promote fructification by causing the embryo spurs to become plump ; throwing more light also through the whole tree. This stopping may commence in the end of July, and be continued in a progressive way all through August, according to the strength of the shoots ; and it will be found both to equalise the strength, and to increase both the size and flavour of the fruit.

In the beginning of July, training or tying down the principal young shoots on espaliers must commence. This, too, is a progressive matter, and will require a little weekly attention until the middle of August ; by which time all principals should be duly placed and fastened ; and whatever waste spray remains after this period, may be at once cut in to within six inches of the main shoots ; such, we mean, as may have escaped the stopping recommended, or have sprung up since that operation.

AUGUST.

If the early part of August is hot and dry, we would strongly suggest the propriety of another watering, especially young trees. Trees carrying heavy crops also should receive a soaking of liquid manure, which, at this period, will work wonders. Little more can be done this month except gathering and storing some of the very early sorts, such as the Keswick Codling and the Manks Codling; these, with some others, will be ready by the end of the month. Some also of the table kinds will be fit for use or for gathering, as the Early Harvest, the Juneatings, the Margaret, and towards the end the Kerry Pippin, Hughes's Golden Pippin, &c.

SEPTEMBER.

Gathering and storing away will be carried on continuously through this as well as the succeeding months. Nothing can be done for the trees at this period. A cool room, tolerably dry, is the best for apples; and we like it best a little below the ground level. They require much ventilation for a few weeks after gathering, especially when a great body of them is placed in one room. After the sweating has ceased we would give little air, especially to them intended for long keeping.

OCTOBER.

Many of the late kinds will require gathering in this month ; indeed, it should be made a point to get all housed by the last week, be they of what kind they may, for they can receive no benefit after this period. Every possible care should be taken over the principal kinds, in order to ensure their keeping well.

NOVEMBER.

The stock and collection should now be well examined, to see if any blank exists, or any link in the chain of succession is wanting to complete the collection. New kinds, or the replacing of old or decayed trees, being determined on, some fresh maiden soil should be instantly procured, to assist in forming what we term stations for them. We have gone so much into this part of the subject in the former part of this volume on the apple, that farther comment here would be superfluous : it may suffice to say that we would direct especial attention to the principles there inculcated, of taking care that the soil used be at least fresh to the apple, and of introducing as much sound loam into the mixture as can be obtained. After planting according to these directions, let the young trees be immediately mulched. The import-

ance of this part of the process has also been dwelt on in previous remarks.

The fruit-room will now require frequent attention. Some ventilation on dry and airy days for a few hours, together with a frequent picking of the fruit, will now be necessary, in order to prevent the spread of destructive fungi. Darkness is well known to assist in the preservation of this fruit, therefore every fruit-room should have shutters to the windows, both to exclude light and injuriously low temperatures.

Pruning may now commence according to the principles laid down for January : the ample details there will supersede the necessity of any repetition here.

DECEMBER.

Nothing fresh can be offered in the way of advice for this month. In taking leave of the subject, we may merely observe that pruning and training may henceforth proceed until the whole is completed. The American blight should have attention immediately ; and it would be well to apply the dressing before recommended without delay.

INSECTS.

NONE of our fruits are more liable than the apple to the depredations of insects. They assail all its parts—blossom, leaves, stem, and root—and they are confined to no season, for some one or other of them may be found at its work of destruction whenever the scrutiny takes place.

So impressed was Mr. Knight with the opinion that of all our fruits none suffers more from insects than the apple, that he declared his belief that these are a more frequent cause of the crops failing than frost. The figure-of-eight moth (*Episema caruleocephala*), Linne denominates the pest of Pemona, and the destroyer of the blossoms of the apple, pear, and cherry. He also mentions another (*Tinea corticella*) as inhabiting apple-bearing trees under the bark. And Reaumur has given us the history of a species common in this country, and producing the same effect, often to the destruction of the crop, the caterpillar of which feeds in the centre of our apples, thus occasioning them to fall. Even the young grafts are frequently destroyed, sometimes many hundreds in one night, in the nurseries about London, by the *Curculio Vastator* of Marsh (*Otiorhynchus picipes*), one of the short-snouted weevils; and the foundation of canker in full-grown trees is often laid by the larvæ

of *Temasia Wæberana*. The sap, too, is often injuriously drawn off by a minute coccus, of which the female has the exact shape of a muscle-shell (*C. Arborum linearis*, Geoffr.), and which Reaumur has accurately described and figured. But the greatest enemy of this tree, and which has been known in this country since the year 1787, is the apple-aphis, called by some the coccus, and by others the *American blight*. This is a minute insect, covered with a long cotton-like wool, transpiring from the pores of its body, which takes its station in the chinks and rugosities of the bark, where it increases abundantly, and by constantly drawing off the sap, causes ultimately the destruction of the tree. Whence this pest was first introduced is not certainly known. Sir Joseph Banks traced its origin to a nursery in Sloane Street; and at first he was led to conclude that it had been imported with some apple-trees from France. On writing, however, to the gardeners in that country, he found it to be wholly unknown there. It was therefore, if not a native insect, most probably derived from North America, from whence apple-trees had also been imported by the proprietor of that nursery. Whatever its origin, it spread rapidly. At first it was confined to the vicinity of the metropolis, where it destroyed thousands of trees. But it has now found its way into other parts of the kingdom, particularly into the cider countries; and in 1810 so

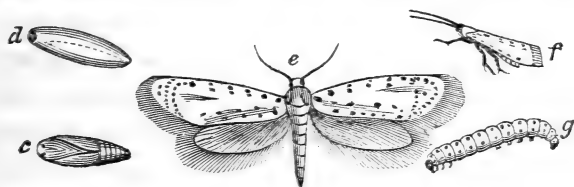
many perished from it in Gloucestershire, that, if some mode of destroying it were not discovered, it was feared the making of cider must be abandoned. (*Kirby and Spence's Entomol.* i. 199.)

Blight.—By this name, most indiscriminately applied, common observers intend every ill that invades the blossoms and leaves of the apple. If they are destroyed by an easterly wind—if they are invaded by legions of aphides—or even if caterpillars abound upon them—the convenient name of blight is adapted to the evil. To such a cloak for ignorance we cannot pay regard, but shall strictly confine ourselves to observations upon each insect marauder distinctively.

Previously to proceeding to the task, we will offer a few observations upon what is usually termed “the blighting influence of the east wind.” In England this wind is proverbially cold and dry, qualities which render it particularly liable to injure tender leaves and blossom, by subjecting them to a rapid ungenial evaporation and reduction of temperature. When so injured, when thus shrivelled and blasted, the term *blight* may well apply. But when, referring to a very different phenomenon, it is said that “the east wind has brought the aphides,” this requires a very important qualification. That such predatory insects are usually most abundant when this wind has been prevalent, does not admit of dispute; but no one,

except the most ignorant, will conclude that the wind creates them. The truth is that insects propagate with rapidity just in proportion as their food is abundant or deficient. Now the food of the aphis is the juice of the young leaves and shoots of the plant, and there is no doubt that more young leaves are put forth to succeed those which have been injured by easterly wind, and that the shoots remain then longer juicy and unripened than in seasons when more genial weather has prevailed.

Yponomenta padella.—Small Ermine Moth.—An-



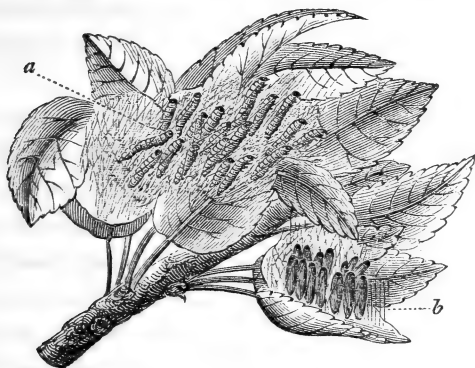
terior wings ordinarily of a leaden white, with about thirty remote minute black spots, disposed somewhat regularly in longitudinal rows, but on the hinder margin they are more irregular, and tend to a transverse disposition: cilia livid. Posterior wings lead-coloured: cilia rather paler. Extremely variable: some examples having the ground of the anterior wings white; others with the costa livid, and the inner margin white; some with a livid or pale lead-

coloured central cloud ; others, again, entirely of a pale or deep lead colour ; and all intermediate shades occur : the number of spots also varies. (*Stephens' Illust. Brit. Lepid.*, vol. iv. p. 243.)

The caterpillar (*g*, rather magnified) of this moth is of an ashy white colour, with a brownish head, and a number of small black spots, of which the largest form a series on each side of the body. It has sixteen feet, the three anterior pairs being articulated, and attached to the three anterior segments. The four following pairs are membranaceous, false, ventral legs ; and the terminal pair anal, and also membranaceous. They are below the middle size, and the body is smooth. In regard to the predilection of this caterpillar for any particular kind of food, only some kinds of apples were affected, which is the more remarkable, because its principal food (whence its specific name is derived) is the bird cherry, although the white thorn is also even more subject to its attacks ; whole hedges being sometimes entirely defoliated in summer, and covered with webs.

It is a peculiarity in the history of this insect, that it is not only social in the caterpillar state (*a*), but that it retains its sociality during the period of its pupation (*b*), the coccoous being formed within the web which had served for the abode of the caterpillars. These webs are quitted from time to time, and new encampments established at short distances from each

other ; hence, each brood constructs several webs in



the course of its caterpillar state ; the reason of which is, that the caterpillars do not quit their webs to feed, but only eat such leaves as are enclosed in each web. The number of inhabitants in a colony varies from one hundred to two hundred ; and, hence, the more numerous the colony, the more frequent is a change of residence required. These webs consist of a great number of threads not unlike spider webs, arranged somewhat irregularly, but sufficiently loose to enable the inhabitants to be seen through the covering. The caterpillars eat only the parenchyma of the upper side of the leaf ; they also arrange their threads longitudinally, each, apparently, having a thread of its own along which it moves either backwards or forwards without disturbing its neighbours, which, when in repose, are arranged side by side.

The manner in which the eggs are deposited, and the young caterpillars developed, appears first to have been noticed by Mr. Major (*Treatis*, p. 51) ; but subsequently, with more precision, by Mr. Lewis (*Trans. Ent. Soc.* i. p. 22). The former writer states that, on the 29th of July, he found the parent coating her eggs over, which she appeared just to have been depositing, with gummy matter (employing her tail in the operation), which, when dry, forms a thin shell or scale, about the eighth of an inch in diameter. On the 19th of October, on examining the scale, he found 26 caterpillars existing, which he was persuaded had never left their abode, as at that time all the parts were completely shut up, and, indeed, the edges of the scale were fast cemented to the branch. He thinks it probable that they may derive some little support from the sap of the branch under the shell or covering where they reside ; but it is quite clear that they never emerge from their birth-place to obtain food, or form any additional residence, till they are influenced by the warmth in the following spring. Mr. Lewis takes up the observation where it had been left by Mr. Major, and states that, about the time that the trees are coming into leaf, the caterpillars make their escape ; but they do not commence spinning webs immediately ; they cannot yet eat the epidermis of the leaves, and they require some protection from the cold and rain, which their tender frames are not yet fitted to endure :

to effect this they mine into the leaves, eating the cellular tissue only, and leaving the epidermis untouched. Having acquired sufficient strength to withstand the vicissitudes of the atmosphere, and to devour the epidermis of the leaves, they make their way out ; and the anxious gardener, who has hitherto only observed the brownness of the leaves caused by the mining, but which is by him attributed to the withering blast of an easterly wind, is astonished when he perceives myriads of caterpillars swarming on his trees, and proceeding with alarming rapidity in their devastating course. The fact of their mining sufficiently explains the reason of their sudden appearance : it shows how one day not a single caterpillar may be visible on the trees, and the next they may be swarming with larvæ of so large a size as to rebut the idea of their having been recently hatched. For the destruction of these insects, various plans have been recommended. Mr. Major says that nothing more is required than the application of strong soap-suds forcibly applied with the engine, so as to break the web, that the suds may reach the insects. Where the trees are not much infested, gather the webs, including the caterpillars, by hand, and destroy them in any way most convenient. Care should, however, in these cases, be taken to kill, and not merely to disturb, the caterpillars. Mr. Lewis suggests the picking off and burning of the leaves whilst the cater-

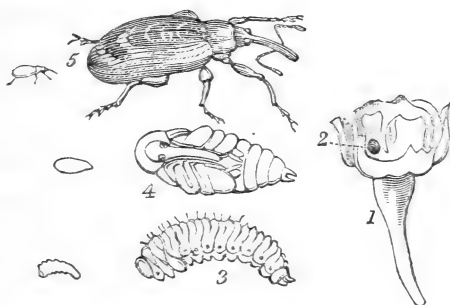
pillars are in the mining state; the presence of the insects being indicated by the blighted outward appearance of the leaf: but prevention is always better than cure, and it seems to us easier, as well as more advantageous, to destroy the moths as soon as they are produced, and before they have had time to deposit their eggs. The generally simultaneous appearance of the entire brood in the winged state, together with the very conspicuous appearance of the moth, will render this a matter of great facility. A sheet may be laid beneath the branches in the daytime, which should then be sharply struck with a stick; when the moths, which at that time are sluggish, will fall into the sheet, and may easily be destroyed: and the destruction of one moth will thus prevent the injuries arising from one, if not several, colonies of caterpillars in the following season. (*Gard. Mag.* iii. 435, N.S.)

THE APPLE-BLOSSOM WEEVIL (*Anthonomus Pomorum*).—In apple-buds attacked by this pest the petals form globes, which assume a rusty colour. On opening one, the stamina and germen are found entirely consumed, the withered petals forming a hollow globe (fig. 1), within which lying a brown pupa. About the middle of June the apple weevils hatch, and on examining the buds a hole is found on one side, from whence the beetles escape from their

tombs (fig. 2). In some seasons the larvæ are feeding the beginning of May, and the beetles have hatched by the 25th. These little animals sometimes occasion great loss to the apple-grower, especially in cider countries in backward seasons, when vegetation is retarded by cold and wet, which afford the beetles a much longer period to perform their operations. Like many other insects in their perfect state, they live through the winter, secreting themselves in the chinks and under the loose bark of trees, beneath stones, clods of earth, &c. In March, when the flower-buds are swelling, the beetles emerge from their retreats, when the males are seen in sunny mornings flying amongst the trees in search of the females, who generally are crawling over the branches, although they are also furnished with wings. They seem to be very careful in selecting proper objects for the reception of their eggs, and on finding a suitable bud, the female bores a hole with her minute jaws, which are placed at the tip of the slender proboscis, until she has reached the parts of fructification, and turning round she lays an egg in the hole by inserting her ovipositor, and then closes it again with her mouth, and seems as if she were forcing in the egg; this is rather a tedious operation, and is said to occupy three-quarters of an hour; she then hastens to another swelling flower-bud for the same purpose, and is thus employed two or three weeks, viz., until the flowers

begin to expand, when her labours cease ; for, as the larvæ can neither bear wet nor sunshine, they require the protection afforded by the closed petals. The eggs are hatching from the beginning to the end of April, principally influenced by the variations of the season ; if the weather be warm, they are matured in five or six days. During this period the bud grows, and the petals of their usual rosy colour, but instead of expanding, they wither, and eventually turn to a rusty brown, and on opening them, in place of the germen and stamina, which have been consumed by a single maggot, one finds rolling about in this globular chamber a pupæ, of a deep ferruginous colour, which is very sensitive and restless when touched (fig. 4). The maggots are curved, fleshy, and whitish, having numerous segments and wrinkles, with a few short hairs, but no legs ; the head is horny and black, and furnished with small jaws (fig. 3). The exact time they remain in the pupæ state has not been ascertained, but in about a month from the period when the eggs are deposited, the weevils hatch, and eating a hole through the dry petals, they disperse over the tree, and feed upon the leaves during the remainder of the summer. Like most of the Curculionidæ when approached, the apple-weevils contract their eggs and fall down, so that it is difficult to detect and capture them in any numbers, except whilst they are pairing,

or when the females are engaged in depositing their eggs.



The apple-blossom weevil was named by Linnæus *Curculio pomorum*, and it has been distinguished by later naturalists as the *Anthonomus pomorum* (fig. 5). It is long and pear-shaped, of a reddish-brown colour, punctured, and clothed with short, depressed, whitish and ochreous hairs; the rostrum is long, subcylindrical, curved and sculptured; towards the apex are placed the antennæ, which are slender and geniculated; the basal joint is very long, slender and clavate—the second is oblong, the six following are more or less globose, and the remaining four form an oval-conical club; the head is subglobose, with two very prominent little black eyes; the thorax is semi-ovate, truncated before with three indistinct stripes of a paler colour; the scutellum forms a white dot; the elytra are elongate-ovate, with nine punctured striæ on each; beyond the middle is a large piceous lunar

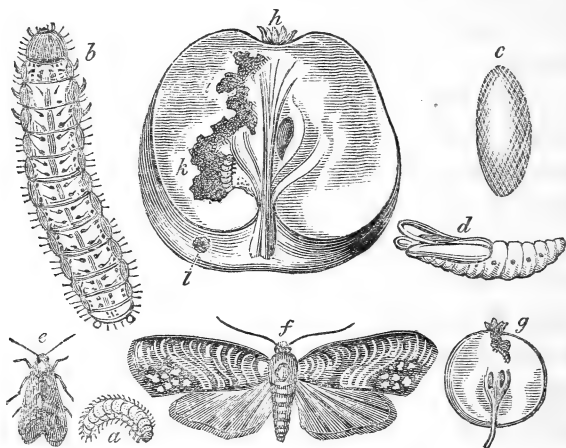
patch, bearing a pale oblique stripe across the centre, forming an angle at the suture; and towards the apex are two ochreous spots; wings very ample; legs moderately long and ferruginous; anterior thighs stout, with a strong tooth beneath—the others are similar, but smaller; the anterior tibiæ are sinuated internally, and they are all terminated by a claw; the tarsi are 4-jointed, the third joint being bilobed, the fourth furnished with minute claws. The smaller figures denote the natural sizes of the animals.

These beetles will also lay their eggs in the flower-buds of pear-trees, and it is on calm days the females are occupied in depositing them; for in windy or frosty weather they retire to sheltered situations. In genial springs, when the blossoms open in a week or ten days, these weevils do little mischief; but in cold, damp seasons, when the buds are three weeks or more in expanding, scarcely an apple-blossom sometimes escapes. The best mode of destroying them is to gather the punctured withered flower-buds and burn them, by which means the larvæ and pupæ will be cut off, and the beetles may be collected by beating the branches over a net; but unless this is done as soon as they make their appearance, it will not be of much service, as the eggs will have been deposited. From various statements it seems that the females will not readily fly, and, as they crawl up the trees, their incursions may be stopped, and the crops saved,

by winding tarred bandages round the upper portion of the trunks. (*Gard. Chron.* 1844, 555.)

THE APPLE OR CODLING MOTH (*Carpocapsa pomonella*).—It is only upon the pulpy parts of the apple (*h*, *i*) that the larva (*k*) of the apple moth feeds during the greater part of its growth: when, however, it has nearly attained its full size, it begins to feed on the pips of the apple, which, thus attacked in its most vital part, soon falls to the ground. The caterpillar, however, has now ceased feeding: it has other operations to undergo; and no sooner is the apple fallen to the ground, than it quits the fruit by the passage (*l*) which it had previously gnawed, and thus all traces of its steps are lost to the inquirer. A hundred apples may be opened, and not more than two or three larvæ observed within them; the orifice by which they have escaped being open, and not concealed by a little mass of brown grains, which is the case with those apples from which the larvæ has not made its escape. These little grains are the excrement of the larvæ, which are also to be seen in the burrows formed by them within the apple, and which are protruded through the hole previously made in the circumference of the fruit, being attached together by slender threads spun by the caterpillar. When, therefore, the larvæ makes its escape, it clears away the mass of dry excrementitious matter at the orifice

of the burrow, through which it escapes to the earth. Reaumur considers that the attaching of the pellets



of excrement together, and to the sides of the fruit, by means of a thin web, has for its object the removal of the annoyance which the larvæ would experience by these little masses being loose, and striking against it every time the apple was shaken by the wind.

One of these larvæ is represented of the natural size at *a*, and highly magnified at *b*. It is of a dirty white colour, with a brown head, varied with darkish brown marks. The body is slightly hairy; the prothorax, or first segment after the head, is whitish, with minute brown spots; the other segments are of a pale colour, with about eight small tubercles

on each; each of the three anterior segments is furnished with a pair of legs; there are also two small fleshy tubercles on each of the 6th, 7th, 8th and 9th segments, as well as a pair of feet at the extremity of the body. This description was made when the larvæ had for some time quitted the fruit. In its early state, it is of a dirty reddish or flesh colour. After quitting the fruit, the larvæ crept to the top of the box in which it was confined, and spun for itself a thin but close web, of a darkish-coloured silk (c), in which it remained all the winter, and for several of the early months of the following year, without assuming the chrysalis state. The caterpillar wanders about on the ground till it finds the stem of a tree, up which it climbs, and hides itself in some little crack of the bark. The fall of the apple, the exit of the grub, and its wandering to this place of safety, usually take place in the night-time. In this situation it remains without stirring for a day or two, as if to rest itself after the uncommon fatigue of a two yards' march; it then gnaws away the bark a little, in order to get in further, out of the way of observation, and having made a smooth chamber, big enough for its wants, it spins a beautiful little milk-white silken case, in which, after a few weeks, it becomes a chrysalis; and in this state it remains through the winter, and until the following June, when it is upon

the wing, and hovering round the young apples on a midsummer evening. (*Ent. Mag.* i., p. 146.)

Our specimens did not appear in the winged state until July, in the following year ; and Reaumur says that his specimens assumed the perfect state on the 15th of August, having been only a month from the time of their quitting the apples. The chrysalis (*a*, magnified, after the escape of the insect,) is of a pale brown, with the dorsal surface of the abdominal segments armed with two transverse rows of fine teeth, like those of the chrysalis of the rose-moth, which are employed in extricating itself from the cocoon.

The moth itself (*e*, of the natural size ; and *f*, magnified) is a very beautiful insect, about three-quarters of an inch in expanse, of which the following is the description :—Anterior wings ashy-brown, with very numerous, rather obscure, darker, transverse streaks, united into a broadish fascia towards the base ; on the anal angle is a large blind subocellated spot, of which the margins are of a coppery or reddish golden colour : posterior wings black, darkish at the apex. (*Stephens*, loc. cit., p. 119.) By whom it is stated that it is not very abundant, but is found in gardens within the metropolitan district occasionally, in some plenty. About three years previously he found several in his garden ; and in 1834 it was again in plenty.

We were not fortunate enough to observe the deposition of the eggs by the female moth, and, anxious to obtain the manner in which the larvæ commenced its attacks upon the fruit, and thereby of gaining an idea of the situation in which the eggs are placed, we opened a number of young apples at the beginning of August, and found the larvæ in a young state, in the upper part of the fruit, at a small distance from the eye (*g*), its presence being indicated by the dried powder in the centre of the eye, the head of the larvæ being turned towards the heart of the fruit. Rusticus, however, states that the moth may be observed, about the middle of June, hovering around the young apples, which by that time are fit for the reception of its eggs, which it lays in the eyes, one only in each, by introducing its long ovipositor between the leaves of the calyx, which form a tent above it that effectually shields it from the inclemency of the weather, or any other casualty. As soon as the egg is hatched, the little grub gnaws a hole in the crown of the apple, and soon buries itself in its substance ; and it is worthy of remark, that the rind of the apple, as if to afford every facility to the destroyer, is thinner here than in any other part, and consequently more easily pierced. The apple most commonly attacked is the Codling, which ripens in July and August.

It will be evident, from the preceding detail of the habits of this moth, that there are considerable dif-

ficulties in the way of its extirpation. It is impossible, for instance, to be aware of the presence of the enemy within the fruit, until the mischief is actually completed; and, in like manner, the destruction of the moth, from its small size, and its habit of secret-ing itself in crevices of the bark, &c., is equally impracticable. The gathering up of the worm-eaten apples immediately after their fall, and before the enclosed caterpillar has had time to make its escape, cannot but be attended with good effect; care, however, must be taken, either by bruising the apples, or some other similar proceeding, to destroy the larva, which would otherwise very speedily make their escape, and so frustrate the pains taken for their destruction. It has also been suggested, that, by burning weeds in the garden or orchard at the time of the year when the insect is ready to deposit its eggs, the moth will be effectually driven away. (*Gard. Mag.* iv. 235, N.S.)

THE APPLE-TREE MUSSEL SCALE, OR DRY SCALE (*Aspidiotus conchiformis*).—Upon the trunks and branches of apple and pear-trees there are found two species of scale-insects, the former of which we will now describe and figure. They are so small, and partake so completely of the substance, colour, and character of the bark, that an unpractised eye would not suspect they were the production and habitation of an insect; and some allied species attached to the

ash and other trees have been mistaken, even by philosophers, for lichens, &c.

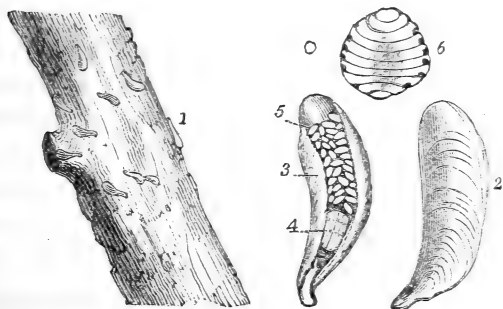
The little animals sticking to the bark of the apple-trees are so similar to mussel-shells, that Geoffroy called them "*Le Kermes en ecaille de moule*," but instead of giving them an appropriate scientific name, he designated them as the *Chermes arborum-linearis*. Gmelin has in some measure supplied the deficiency, by describing them under the name of *Coccus conchiformis*; but if he had applied the term of *Mytiliformis*, mussel-shaped, it would have been more significant. These scales do not lie in one direction, as others generally do, with their heads downward, for some of the apple-tree scales are placed vertically, others obliquely, and many have a transverse direction (fig. 1); and sometimes they are crowded together in immense multitudes in every possible position, even lying one over another. The scales are hard, dark, and shining; they are exceedingly like a minute mussel-shell, but rather more elongated; they are slightly curved, transversely wrinkled, rounded at the tail, and attenuated at the head, which is semi-cylindric, less opaque, and of a rusty colour (fig. 2). These adhere firmly to the bark, having the margins broad beneath and woolly (fig. 3), and when dislodged, the space they had covered appears white. Within the shell is found a fleshy-green female, occupying part of the cavity towards the tapering extremity (fig. 4),

the hinder space being entirely filled with white oval eggs, amounting sometimes to 50 or more, (fig. 5) ; they are rather larger than in most species, and produce little white flat cocci, with two antennæ and six legs ; they are lively, and run about for several days, but having fixed themselves, then grow ; and by degrees become very different creatures to what they were immediately after their birth.

On opening the scale, and taking out the female, it will be found that she is not attached to the shield, and that consequently this mussel-scale is not a true coccus, but an aspidiotus : it is a fat yellowish green maggot, nearly orbicular, very convex, shining, with distinct transverse stride, indicating the abdominal segment ; a pale brown line visible down the back, from the alimentary canal, shining through the thin and transparent skin (fig. 6).

A contributor to the *Gardener's Magazine* says, " A scale of a brown colour, pointed at both ends, and less than half the size of a seed of common flax, abounds in the north of Cambridgeshire, on the branchlets of old apple-trees ; and in unlading the trees in autumn of their ruddy riches, here and there an apple occurs to whose rind one or more of these scales firmly adhere, and where it must have become fixed before the apple's growth was finished ; as, when the scale is removed, a slight depression in the rind of the apple is perceptible." The same scale, it

is said, is very prevalent in Cheshire on the pear-trees, where it is considered to be injurious to the fruit, as, by clinging to the rind, it prevents the fruit from swelling to its full size. It is asserted that peaches, apricots, plums, &c., suffer from the attacks of the mussel-scale; and if young Ribston Pippins and some varieties of pears be planted near any other apple or pear-tree that already supports these insects, they will speedily migrate to them. The same observer says, "I believe this disease is mostly, if not entirely, confined to wall-fruit in the open air, standards not affording them sufficient warmth and shelter during our winters in Scotland, where they have been very abundant and very troublesome. They attach themselves to the bark, and by means of their rostrum they soon exhaust a branch so completely of its sap that it withers and dies." Mr. Ingpen recommends "two or three applications in the spring, at



intervals of one or two weeks, of strong lime-water with a brush, and a dusting of quicklime before the branches get dry ; or a washing of soft-soap and water, using also the powdered lime," which is perfectly harmless to vegetable life.

Although it is generally trained trees that are most attacked by the mussel-scales, standards are often so covered with them that they are completely hide-bound. The best plan for getting rid of these scales is to scrape the bark with a wooden knife, so as to bruise and crush the females without lacerating the tree, and immediately to wash over the trunk and branches with some gas-tar. If any other season should be preferred, the best season for applying it will be in May, when the young ones are creeping from under the scales, and are easily destroyed ; but they are so minute that it will be necessary to use a magnifying glass to ascertain when they are hatched and in motion. (*Gard. Chron.* 1843, 735.)

APPLE CHERMES (*Psylla mali*).—This insect is closely allied to the aphid, and is thus described in M. Kollar's too-much neglected work on "Insects injurious to Gardeners." It usually appears in June. In September, the apple chermes pair, and lay their eggs: they are white, and pointed at both ends, a line and a half long, and the fourth of a line thick, and become yellow before the young escape. The

apple chermes lays its eggs in different places of the twigs of an apple-tree ; usually, however, in the furrows of the knots, and sometimes in a regular manner. The larvæ were scarcely escaped from the egg, in the open air, when they hastened to the nearest bud, and began to gnaw its scales, because the bud was only somewhat swollen; and had not begun to sprout. On the second day after their birth they cast their first skin, after which they appeared nearly of their former shape and colour. The second changing of the skin can sometimes be scarcely seen at all, because the larva not only puts out a thicker string with the tubercle, but also an immense number of very fine entangled threads or small hairs, which it turns upwards over its back, and with them entirely covers its body and head. In sunshine, these strings look transparent, as if they were made of glass, and become of a greenish variable colour. Under this screen the chermes are secured from every attack of other insects ; for no ants, mites, or bugs can disturb them in their fortification, or consume them as their prey. After changing the second skin, the young assumed a different colour and form : they now became light green all over ; the abdomen was much broader than the thorax, and, on the side of the latter, rudiments of the wings were distinctly seen. The third time of changing the skin comes on in about eight days, sometimes sooner and sometimes

later, according to the weather. After this skin the wing rudiments very distinctly make their appearance, and become larger and whiter the nearer the insect approaches to the perfect state. The body is also of a light green, and the larvæ have black eyes and blackish antennæ. At last the time arrives when the insect assumes the perfect state ; when it retires to a part of a leaf which it had selected, and after having firmly fixed itself there, the back splits open, and the beautiful winged chermes appears from the nymph. The back of the thorax is of a light green, the abdomen is marked with yellow wings, and the membranous wings with strongly-marked veins.

APPLE-BARK BEETLE (*Bostrichus dispar*), fortunately, appears in England very rarely. The female of this species bores into the wood of the apple-tree, depositing there her eggs, usually, in the month of May. Its perforations, in Germany, are so numerous and extensive as frequently to destroy the tree. The perforations are confined to the alburnum of the wood.

SMALL-BARK BEETLE (*Scolytus hæmorrhous*).— This is of still more rare occurrence than the preceding. It is black, and the ends of the wing-cases reddish ; feet brownish red ; wing-cases furrowed longitudinally, and distinctly spotted. The insect is very small, the largest being no more than three-fourths

of a line in length. The female deposits its eggs in furrows made in the inner bark and alburnum. Schmidberger saw reason to conclude that this insect only attacks sickly trees. It commences its boring in May, and the larvæ continue feeding until late in the autumn.

AMERICAN BLIGHT (*Eriosoma lanigera*—*Aphis lanigera*).—We have glanced at the history of this comparatively recent plague of our apple-trees, and have but little to add to that narrative. Above all the insects infesting the apple-tree this is the most prejudicial. Some fifteen years since, we purchased a lot of Crabstocks from an eminent nurseryman for grafting on; up to that period we had not an individual of this species in the gardens. The unlucky Crabs were infested with it, as indeed were all the apples and stocks in the above nursery; and from them it took to the apples of the kitchen-garden, and, in spite of numerous dressings, we have never been able to get completely rid of it to this day.

Before proceeding to enumerate the various remedies which have been suggested, we will particularize a little more fully the phenomena attendant upon the appearance of this insect. The cottony matter appearing in the cracks and excrescences of apple-tree branches in the spring envelopes colonies of this insect, and which, when crushed, exude a reddish fluid.

These insects are injurious by piercing the sap vessels with their probosces, sucking the juice of the tree, and causing wounds which ulcerate and finally destroy the branch attacked by corroding through all the sap vessels. The excrescences or knobs attendant upon the attacks of these insects are really caused by the efforts of the tree to repair the injuries. The cottony matter is abundant, and, wafted to other trees, probably conveys to them infection, by bearing with it the eggs or embryo insect. But this is not the exclusive mode of diffusing the disease, for although the females are usually wingless, yet, like many other insects, some are probably produced with wings at the season propitious to colonization. The males are uniformly winged. In the winter these insects retire underground, and prey upon the roots of the apple-tree. A tree thus ravaged at all seasons will soon be killed, if prompt and vigorous remedies are not adopted. The affected roots may be bared and left exposed for a few days to the cold, and the earth, before returned, be saturated with ammoniacal liquor from the gas works. In early March the branches should be scraped, and scrubbed with the same ammoniacal liquid, or a strong brine of common salt; but whatever liquid is employed, the scraping and hard bristles of the brush should penetrate every crack in the bark. This treatment, repeated and persevered in so long as the least appearance of the insect is observed, never fails of a

cure. Linseed, or rape oil, or spirit of tar, applied to the infected part, and repeated a second or third time with a brush, are also effective remedies. They suffocate the insects. Strong pyroligneous acid applied in the same mode is also said to destroy this as well as the scale insect. The Codlin and Juneating are particularly liable to be infected ; but we never observed it upon any of the russet apples ; and the Crofton pippin is also said to be exempted.

Painting over every patch of this insect with hot glue ; dabbing them with a mixture of oil of vitriol and water (1 ounce of the first to 7 of the latter) are also said to be effectual modes of destroying these pests.

We were long since perfectly aware that train oil would destroy it, but we have little faith in using materials which have a tendency to close the pores of the tree. We have, therefore, tried various recipes, and we think that urine and soft-soap water in combination are the best. We beat up four ounces of the soap to a gallon, and blend this with an equal portion of urine ; and beat up as much clay into the whole as will produce a thick paint ; sometimes we add a little sulphur. This mixture is rubbed well into every crevice directly the leaves are fallen, and wherever it comes in contact with the insect this is destroyed. The most difficult part of the affair, however, is to touch them all, the stems possessing so many crevices. It is well to add some lime to the mixture ; by this

means we can readily discern, under a dry state of atmosphere, what parts have been missed in the first dressing, and apply a second accordingly.

THE RED SPIDER (*Acarus tellarius*) is a great pest to the apple in dry summers, and on hot soils. Water and sulphur are the best remedies. A liberal watering of manure-water at the root, and a thorough dusting of sulphur on the back of the leaves, will soon subdue them.

USES.

THE apple-tree is cultivated chiefly for its fruit, but this is not the only part that is valuable to man.

The wood of the wild apple is tolerably hard: it turns very clean; and when made into cogs for wheels, acquires a polish, and lasts a long time. The bark of the apple-tree affords a yellow dye, and the acid juice of the crab-apple is called verjuice, forming a harsh, austere vinegar.

The apple-tree, however, is most extensively cultivated for the purpose of converting the juice of its fruit into *cider*. In previous sections we have entered into details pointing out the varieties best suited for making this truly English liquor, and the mode best suited to their cultivation, and it now only remains for us to

give a slight sketch of its manufacture and of the different qualities.

Cider is manufactured with very rude machinery, by the following process. The apples are thrown into a circular stone trough, usually about 18 feet in diameter, called the chase, round which the runner, a heavy circular stone, is turned by one or sometimes two horses. When the fruit has been ground until the rind and the core are so completely reduced that a handful of "must," when squeezed, will all pass without lumps between the fingers, and the maker sees from the white spots that are in it that the pips have been broken, a square horse-hair cloth is spread under a screw-press, and some of the must is poured with pails upon the hair, the edges and corners of which are folded inwards so as to prevent its escape. Ten or twelve of these hairs are piled and filled one upon the other, and then surmounted with a frame of thick boards. Upon this the screw is slowly worked down by a lever; and with the pressure, a thick brown juice exudes from the hairs, leaving within them only a dry residue, which, in years when apples are scarce, is sometimes mixed with water, ground again, and the liquid pressed out as before. This latter product is called 'water cider,' a thin unpalatable liquor, which is given to the labourers early in the year. The cider is received by a channel in the frame of the press upon which the hairs stand, emptying into a flat tub called

a 'trin.' From the trin it is poured with buckets or 'racking cans' into casks, placed either out of doors or in sheds where there is a free current of air. In about three or four days, more or less according to the heat of the weather, the liquor usually will ferment; the thick heavier parts will subside as a sediment at the bottom of the cask, and the lighter become bright clear cider. This should then be 'racked' or drawn off into another cask, and the sediment be put to strain through linen bags, and what oozes from them should be restored.

It is during the fermentation that the management of cider is least understood, and that there is the greatest hazard of injury. It is necessary also to know what fruit will by itself make good cider, which kinds should be ground together, and what proportions should be mixed. But it is in the preservation of strength and flavour after the cider is ground that the principal difficulty consists: *slight* fermentation will leave the liquor thick and unpalatable; *rapid* fermentation will impair both its strength and durability; *excessive* fermentation will make it sour, harsh, and thin. Other things being equal, that cider will probably prove the best in which the vinous fermentation has proceeded slowly, and has not been confounded with the acetous. The remedies used in cases of cider not clearing are either yeast or the addition of cider in a state of fermentation, isinglass, eggs, or a quart

of fresh blood stirred up with the liquor; in which last case it is to be racked on the following day. These do not always prove effectual. But the common evils are excess or rapidity of fermentation; and if a better quality than farm-house or 'family drink' is sought, cider requires so much care to prevent its being spoiled, that the best and most careful makers frequently have it looked at during each night for some weeks after it is made; and if the bubbling hissing noise, the sign of fermentation, becomes frequent or too loud, the liquor is immediately racked off into another cask: this check often requires to be repeated several times; but although at each racking some portion of the strength will be lost, the body, flavour, and sweetness will chiefly be retained. It is not the habit of the farmer to add sugar, treacle, brandy, or any colouring matter to the liquor; it is only adulterated in the hands of cider dealers and publicans, who will not lose a hogshead; and if one has turned sour, or has been otherwise damaged, it must be 'doctored,' in order to render it marketable.

At the beginning of January the cider is moved into cellars, where, by large growers, it is frequently stored in casks of great capacity, containing 1000, 1500, or even 2000 gallons; these are cheaper in proportion than smaller vessels, and are thought to preserve the cider better. In March the liquor is bunged down; it is then fit for sale, and may be used soon

afterwards, though it will greatly improve by keeping. If bottled cider is required, it should be bottled and wired in the September or October after it is made ; some persons prefer an earlier time, the end of April or the beginning of May ; a greater degree of effervescence is thus attained, but a considerable loss occurs from the number of bottles that will burst.

The strongest ciders are made from fruits which possess some degree of astringency ; and this quality is so necessary in the pear, that we have never known a single instance in which perry, made from fruits that were without astringency, did not become sour before the middle of the succeeding summer. It may be preserved by a mixture of the harsh juice of the crab, and this is effected more by the astringent than by the saccharine matter the latter contains.

The merit of cider will always depend much on the proper mixture, or rather on the proper separation of the fruits. Those whose rind and pulp are tinged with green, or red, without the mixture of yellow, (for that colour will disappear in the first stages of fermentation,) should be carefully kept apart from such as are yellow, or yellow intermixed with red. The latter kinds, which should remain on the tree till ripe enough to fall without being much shaken, are alone capable of making fine cider. Each kind should be collected separately, and kept till it becomes perfectly mellow. For this purpose, in the common

practice of the country, it is placed in heaps of ten inches or a foot thick, and exposed to the sun and air, and rain ; not being ever covered except in very severe frosts. The strength and flavour of the future liquor are, however, increased by keeping the fruit under cover some time before it is ground ; but unless a situation can be afforded it, in which it is exposed to a free current of air, and where it can be spread very thin, it is apt to contract an unpleasant smell, which will much affect the cider produced from it. Few farms are provided with proper buildings for this purpose on a large scale, and the improvement of the liquor will not nearly pay the expense of erecting them. It may reasonably be supposed that much water is absorbed by the fruit in a rainy season, but the quantity of juice yielded by any given quantity of fruit will be found to diminish, as the fruit becomes more mellow, even in very wet weather, provided it be ground when thoroughly dry ; and we are not quite satisfied that the apple does not receive benefit from the sun and light, subsequently to its being taken from the tree. The advantages therefore of covering the fruit will, probably, be much less than may at first sight be expected. No criterion appears to be known by which the most proper point of maturity in the fruit can be ascertained with accuracy, but we have good reason to believe that it improves, as long as it continues to acquire a deeper shade of yellow, without

decaying. Each heap should be examined prior to its being ground, and any decayed or green fruit carefully taken away. The expense of this will be very small, and will be amply repaid by the excellence of the liquor, and the ease with which too great a degree of fermentation will be prevented. Each kind of fruit should either be ground separately, or mixed with such only as becomes ripe precisely at the same time; but it is from the former practice that fine ciders, of different flavours and degrees of strength, are best obtained from the same orchard. The practice of mixing different varieties of fruit will, however, often be found eligible; for it is much more easy to find the requisite quantities of richness, astringency, and flavour, in three varieties of fruit, than in one; and hence ciders, composed of the juice of mixed fruits, are generally found to succeed with greater certainty than those made with any one kind. By mixtures, also, the cider-maker, being able to give to each cask a less portion of acid or astringency, may best accommodate different portions of his liquor to different palates and constitutions. (*Knight on the Apple*, 107.)

In 1830 the tax upon cider, of ten shillings a barrel, was taken off (*M'Culloch, Dic. Com.*), and in the same year an Act was passed allowing any person to sell cider upon the payment of £2 2s annually for a license from the Excise. This act was amended in 1834, and a license for the sale of cider was in 1836

granted by the Excise to an application signed by six ratepayers of the applicant's parish, the payment being £3 3s if the liquor is to be drunk on the premises, £1 1s if it is not. These alterations have necessarily added greatly to the consumption; but the increase of orchards during the last twenty years, and the late productive seasons, have fully supplied the demand. During the years 1833-4-5 the price in the hands of the grower may be thus estimated:—

Of the best cider, from 1s to 1s 6d per gallon; good, from 10d to 1s per gallon; family cider, used by farmers and in public-houses, from 4d to 10d per gallon; 'drink' for labourers, from 2½d to 6d per gallon. These prices amply remunerated the farmer, who, in many instances, might increase his profits by a diminution of the cost of production. It cannot certainly be supposed that small growers can go to the expense of procuring much machinery; nevertheless the extreme clumsiness of the present wasteful system would fully warrant larger owners in erecting suitable buildings and apparatus. It is true that some improvements have been made, that larger mills are used, that in the press an easily-worked iron screw has been substituted for an awkward wooden one; but far more remains to be effected. If the mill was placed upon a first floor, which could easily be done in a building erected against a bank, or having an inclined plane, so that horses might enter at that height,

all lifting of the cider from the trin might be saved, as a pipe might be carried from the press into casks in the cellars underneath. Again, if the casks in the cellars were placed upon stages, manual labour in racking might be dispensed with, and waste from spilling saved, since a pipe from a hogshead upon a high stage would empty the liquor into a cask on a lower. No use, again, is made of the siphon, a cheap instrument within the reach of any farmer's purse, which would no doubt be serviceable and economical.

The quantity consumed by workmen is very large; two or three quarts a day is the usual allowance given in Herefordshire by masters; and in harvest-time, many labourers drink in a day ten or twelve quarts of a liquor that in a stranger's mouth would be mistaken for vinegar; they do not like sweet cider. Notwithstanding so great a quantity is consumed, there do not appear to be any diseases peculiar to, or very general in, cider countries; idiocy and rheumatism have been stated to be very prevalent in such districts; but even if this is true, cider-drinking has in no way proved to be the cause. It is remarkable that, during the continuance of the cholera in this kingdom, there occurred very few cases in Devonshire, and none in Herefordshire, although the sickness reached the adjoining counties at the time of harvest, when cider is drank to excess.

Cider of good quality is made in Ireland, in the

counties of Waterford and Cork; in Normandy, whence we have many of our best apples; in Belgium; and of inferior quality in Germany. It is also made in abundance, and of excellent quality, in many parts of the United States. (*Penny Cyclopædia*.)

Preservation of Apples.—There are two things to be especially guarded against in the fruit store-room—putrefaction and excessive evaporation—for decay and shrivelling are almost equally obnoxious if present in fruit for the dessert.

We have already remarked upon the fitness of fruit for gathering, and of the precautions requisite to be observed in that process of harvesting; but we will observe, in addition, that two-thirds of the *early* apples should be gathered ten days before they are ripe, taking them carefully one by one, and placing them in a cool fruit-room; these will succeed those left to ripen on the trees. Look over these every morning, and pick out the best fruit for the day's consumption; if they do not ripen fast enough, remove a few occasionally to a warmer room or kitchen, where they will soon get mellow enough. Those for kitchen use should also be gathered before they are quite ripe, and the ripest of them may be selected for the daily consumption.

Cupboards or shelves in a dark, cold cellar are the best store places for apples. The shelves, having a

rim about one inch in height all round, to prevent the apples tumbling off, about six inches apart, and made to slide in and out for the convenience of sorting. The apples must be placed so as not to touch each other, and rest on the eye; if left a month in this way without looking at them, and although during that time one or two may have shewn symptoms of decay, the contagion will not spread in the same manner that it does when they are packed in layers with straw in open frames, or exposed to the light without any covering. (*Gard. Chron.* 1843, 336.)

We were of opinion, at one time, that dryness was an essential for the long preservation of apples from decay, but later experience and observation has led to a contrary conviction. Apples that have remained, accidentally, in tufts of box edgings, exposed to all the wet and vicissitudes of winter, have been found in the spring following as plump and sound as when they first fell from the tree, whereas those in the store-room were then either shrivelled or entirely decayed.

Mr. C. Diplock, gardener at Heath Lane Lodge, Twickenham, has made the following observations upon this point:—Apples do not require to be kept so dry and warm as many people imagine; and if kept very dry, you can never keep apples till January without shrivelling. Mr. Diplock had two casks made air-tight—one filled with apples put in dry sand; the other filled with apples wrapped separately

in paper ; and the heads of the casks put in and made secure with plaster-of-Paris. When opened in March every apple was quite rotten. Apples always perspire more or less, and a little air now and then is useful, and helps to preserve them ; but they should on no account be handled in frosty weather. It is thought by most gardeners that apples will not keep unless gathered when dry ; but about eight years ago, during a wet season, he had a large quantity gathered when it rained hard—laid them on a floor which was covered with straw ; the next day being fine, had more gathered in a dry state, which he laid near the others ; and found that both kept equally well ; for the wet ones soon became dry, and the others perspired. Since then he does not mind their being gathered wet, nor does he wait till the dew gets off before he gathers them. Of course he prefers gathering when the trees are dry. (*Gard. Chron.* 1842, 588.)

Mr. C. Harrison, F.H.S., has some remarks all tending to prove that coldness rather than dryness is most essential for the preservation of this fruit. In winter, he says, if the weather is clear and frosty, the windows or ventilators should be kept open several hours each day ; but when the weather is damp, they are to be kept entirely shut ; and no fire should ever be used in the fruit-room, as it always causes a damp to arise, which does infinite injury to the fruit. Frost

does not materially affect apples, for apples completely frozen have kept equally well with the rest ; but then no artificial means must be used to thaw the frost. After the first of March the fruit-room must be close shut up, for the admission of much air after that period causes the fruit to shrivel up and lose their colour ; and they should be handled as little as possible after the month of May, nor should they ever be wiped until they are about to be used for the table, for they soon become unsound after being so treated. Apples will be found to keep better and much longer in this simple way than by the usual practice of covering with hay, straw, moss, or any thing else whatever ; for fruit crowded together, or covered up with any material, will in a short time become heated, and deprived not only of its gloss and colour, but also of its flavour. In the way recommended above, the codlins and softer kinds of baking apples have kept good till the end of June, and the pippins, as well as various sorts of dessert apples, to the end of October, with their colour as fresh as when they were first gathered, and their flavour not in the least deteriorated. (*Gard. Mag.* iii. 10.)

Even though the apples are so placed as not to touch each other, yet it is very essential that all decaying ones should be removed as soon as observed, for it is well-known that all vegetable decomposition of this kind is attended by parasitical fungi, the mi-

nute seeds of which float to other apples in their vicinity, and thus hasten, if they do not instigate, their decay.

Mr. G. Fielder, gardener at Wadhurst Castle, is very decided upon this point. He says, one very essential thing in keeping apples is, that due attention be paid to picking out those which are rotten. Much fruit is saved by doing so; and it is necessary that apples should have a general searching in order to be effectually cleared. It is useless where persons whenever they visit their fruit-room have been contented with picking out only such decayed ones as first presented themselves to sight; as many still remain to contaminate those adjoining. (*Gard. Chron.* 1842, 638.)

Storing in Sand.—Apples placed in boxes or other enclosures in alternate layers with sand often will undoubtedly keep a length of time, but at others we have known them decay to a very serious extent; and apples so kept are always deficient in flavour. The only mode of obviating the latter defect is to keep them for a fortnight before using on an open shelf.

Mr. J. Stewart, of Pinkie, gives the following directions for this mode of keeping. Some glazed earthen jars must be provided, with tops or covers; and also a quantity of pure pit-sand, free of any mixture; this is to be thoroughly dried on a flue. Then put a layer

of sand an inch thick on the bottom of the jar; above this a layer of fruit, a quarter of an inch free from any other. Cover the whole with sand to the depth of an inch; then lay a second stratum of fruit, covering again with an inch of sand, and proceed in this way till the whole be finished. An inch and a half of sand may be placed over the uppermost row of fruit. The jar is now to be closed and placed in a dry airy situation, as cool as possible, but entirely free from frost.

The usual time at which each kind of fruit ought to be fit for the table being known, the jars containing such fruit are to be examined, turning out the sand and fruit cautiously into a sieve. The ripe fruit may be laid in the shelves of the fruit-room for use, and the unripe is carefully to be replaced in the jars as before, but with fresh dried sand.

Some kinds of apples managed in this way, says Mr. Stewart, will keep till July. Pears will keep till April; the Torling till June. (*Caled. Hort. Mem.* i. 208.)

That dryness is not essential for the long keeping of apples is proved by the fact that in Herefordshire the practice is adopted by some parties of actually throwing water over the stored fruit. The practice of one orchardist is to cover the floor of his cellar with hurdles two in thickness, and on these to place a little straw, upon which the apples are placed with-

out further care or attention, except removing all that appear to be faulty as he brings them into the cellar ; and he thinks it unnecessary to use any particular care in this respect. He had at one time, one hundred and ten bushels thus heaped up in a small cellar, and two or three times each week he gave them a good wetting with fresh water, as much as he thought would well wet the whole of them. The water drains off, through the straw and hurdles, into a well. In this way, he stated that his apples keep well until the period at which he usually disposes of them—the best to make him a good return after Christmas. (*Gard. Chron.* 1842, 805.)

Other testimony, conclusive that moisture rather than dryness is essential to the keeping of apples in good order, is afforded by the numerous evidence we have that they keep superiorly if stored under a covering of earth, according to the mode in which potatoes are “hogged.” Mr. Marnock, Curator of the Botanic Garden, says, that by putting apples in pits in autumn, retaining them there through the winter, until taken up in March, they still retain the same degree of hardness as when pulled from the trees, which of course was not the case with those kept upon shelves. The following are the sorts which were kept in this way, and their condition when taken out :—The Ribston Pippin rotted one-tenth ; Red-streaks, three-fourths ; Flowery Town, one-sixth ; Royal Rus-

set, one-eighth; Golden Pippin, one-sixth; Mount House, one-tenth; Red Robin, none. (*Gard. Mag.* iii. 284.)

Mr. R. Donald, of Woking Nursery, was still more successful in preserving his apples in this manner. He had a trench dug five feet wide, one foot below the surface of the ground, and 12 feet long; covered the bottom and sides with turf, the grassy side upwards, and then filled the space with Golden Knobs and some French Crabs, about $2\frac{1}{2}$ feet deep in the centre, sloping a little to the side; he then covered them close with turf, the grassy side next the fruit, to keep them clean, and had the ridge covered with mould a foot thick, to keep out the frost and exclude the external air. In the end of April following they were taken out in fine preservation. (*Gard. Mag.* i. 209.)

There are many modes of preserving apples in sugar, and by drying, known to every housewife, but the following very efficient and simple method is not so generally practised as it deserves.

Any good baking sort, which is liable to rot, if peeled and cut into slices about the thickness of one-sixth of an inch, and dried in the sun, or in a slow oven, till sufficiently desiccated, may be kept in boxes in a dry place for a considerable time; and the slices only require to be soaked in water for an hour or two before using. (*Jour. of Science*, July 1827, 272.)

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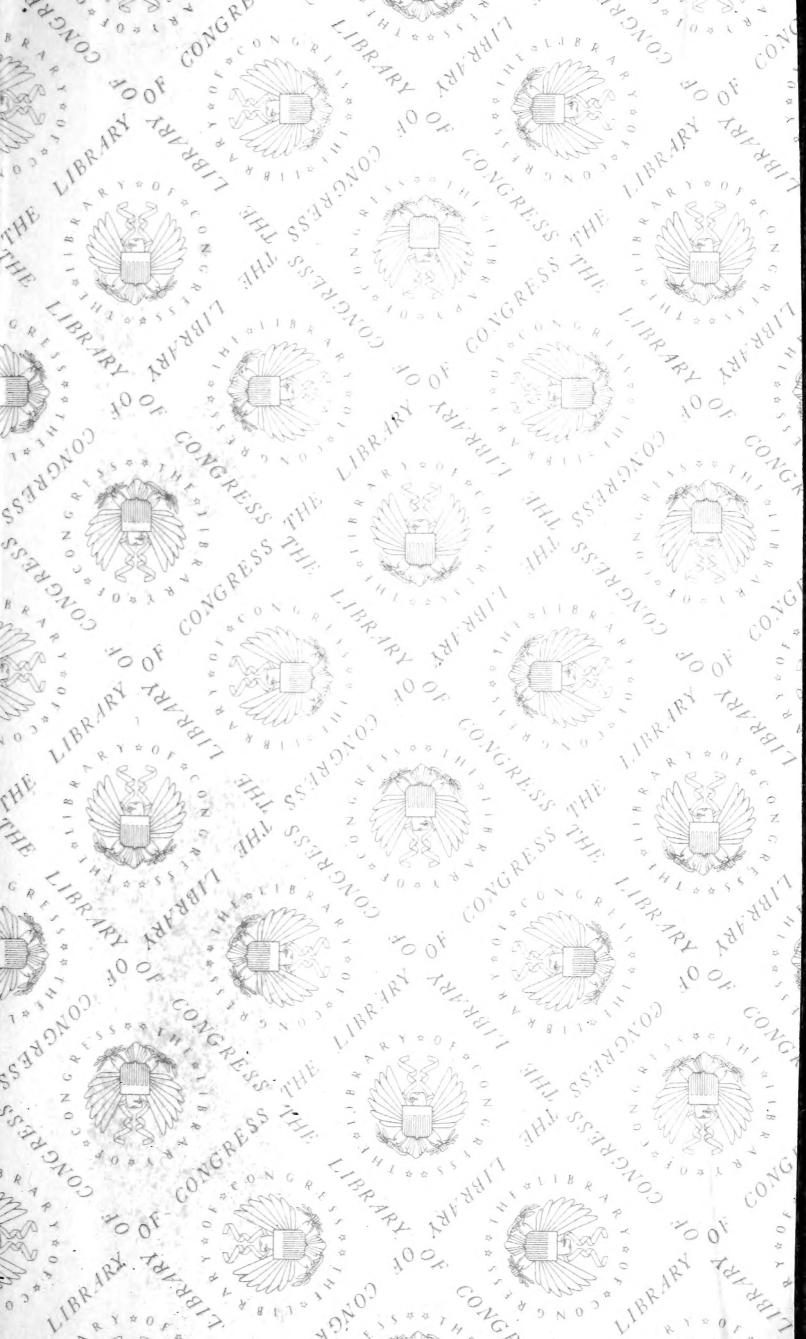




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